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Applicant:	Werner BOLTSHAUSER	Conf.:	5927
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For: **METHOD AND DEVICE FOR APPLYING A FILM PIECE TO A CAN BODY**

LETTER REQUESTING REPUBLICATION OF PATENT PUBLICATION PURSUANT TO 37 CFR 1.221(b)

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February 21, 2007

Dear Sir:

A material mistake on the part of the United States Patent and Trademark Office has resulted in the publication of the wrong title, abstract, specification, and drawings in connection with the above-identified publication, U.S. National Phase of PCT/CH04/00004. Republication of the Patent Publication is respectfully requested as this is a mistake which affects the public's ability to appreciate the technical disclosure of the patent application publication or determine the scope of the provisional rights that an applicant may seek to enforce upon issuance of a patent.

The Notice of Recordation, mailed June 21, 2006 did list the correct title for the above-identified application. A review of the Electronic File History (Image File Wrapper) on Private PAIR shows that no documents were submitted between receiving the correct Notice of

Recordation mailed June 21, 2006 and receiving the Notice of Publication mailed on October 26, 2006. The Notice of Publication directs Applicant to a publication which lists the wrong title, and publishes an abstract, specification, and drawings which are identical to the abstract, specification and drawings filed in connection with a different application, and not identical to the abstract, specification and drawings filed in connection with this application (the abstract, specification, and drawings appear to be a copy of application serial number 10/502,939, which was previously published correctly as 2005/0218148, a copy of which is attached hereto). Copies of the correct application and drawings as filed in connection with the present application are attached hereto.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 08-0750 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Very truly yours,

HARNESS, DICKEY & PIERCE, PLC

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(54) DOSING BODY WITH AN EXTERNAL BASE COVERING, METHOD AND DEVICE FOR APPLYING THE BASE COVERING

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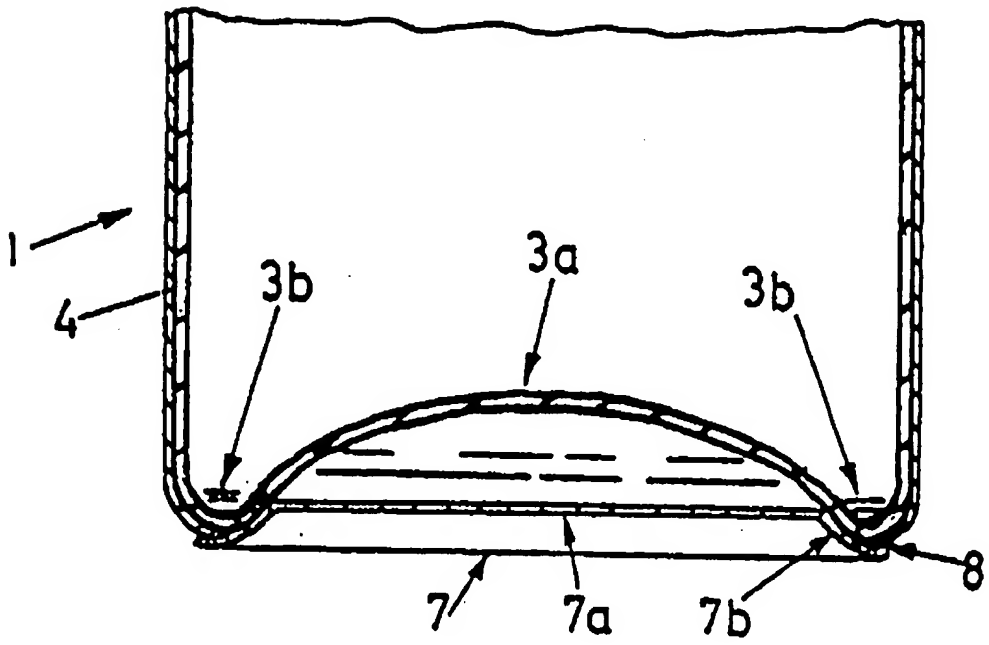
(57) ABSTRACT

A can body with a jacket-like closed wall and a base constructed on one end of the can wall includes an external base covering in the form of a sheet material. The base covering is fixed into position on an annular connection region of the can body. The base covering can form a basically flat imprintable region in a main region that is surrounded by the connection region. If a bar code can be applied in this imprintable region, then a restriction of the configuration possibility of the can wall disappears. The base covering can form a stand region whereby a standing can body is only in contact with the support surface if necessary via the base covering, and consequently the occurrence of corrosion problems is prevented. A retaining device that leaves the base of a held can body free and a position fixing apparatus are used for fixing the base covering into position. A decorative foil on the exterior of the can wall can be overlapped by the base covering, which serves to prevent a detachment of the decorative foil on the base.



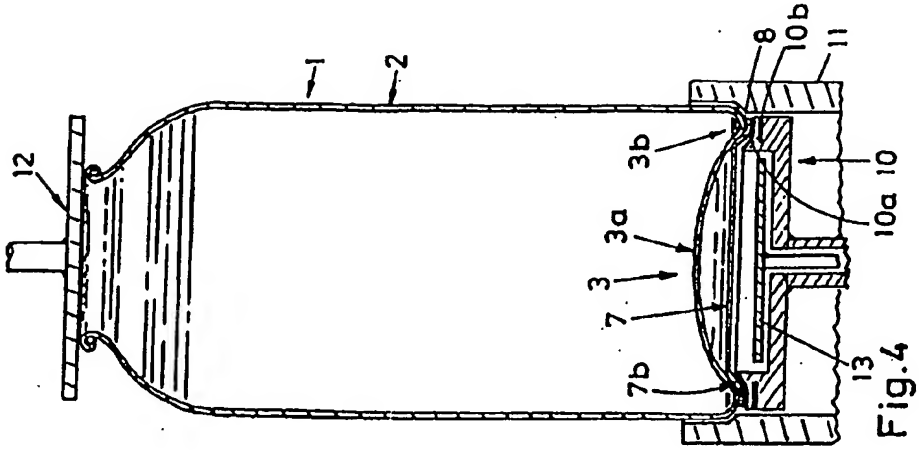


Fig.4

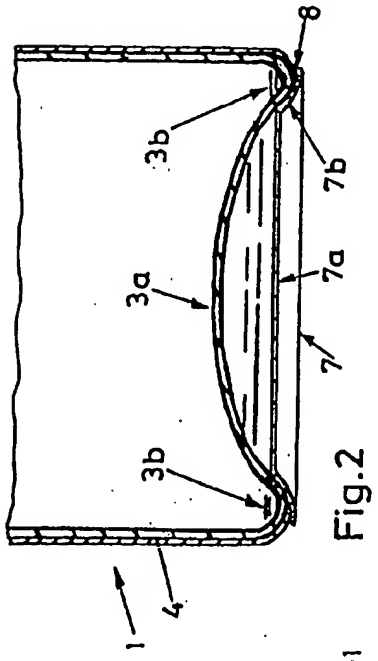


Fig.2

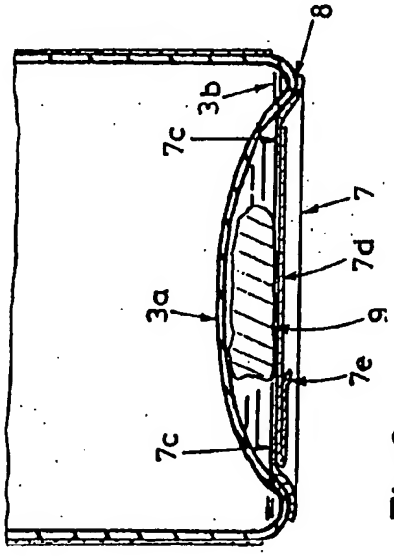


Fig.3

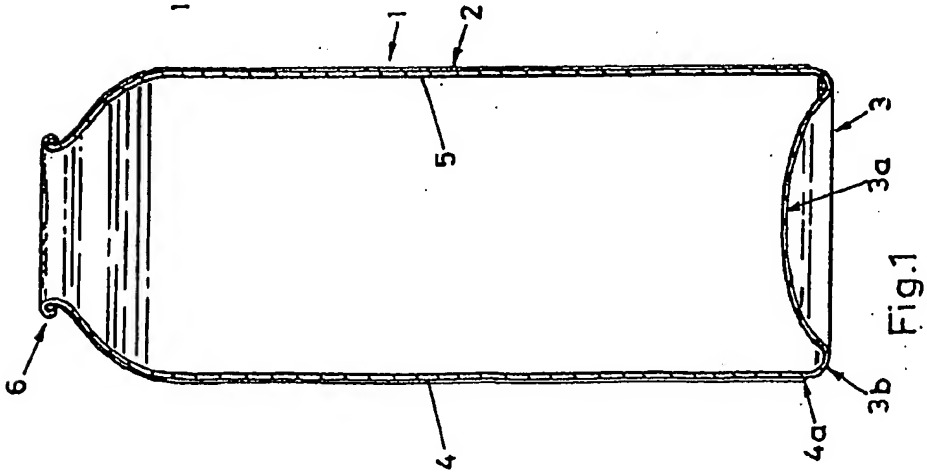


Fig.1

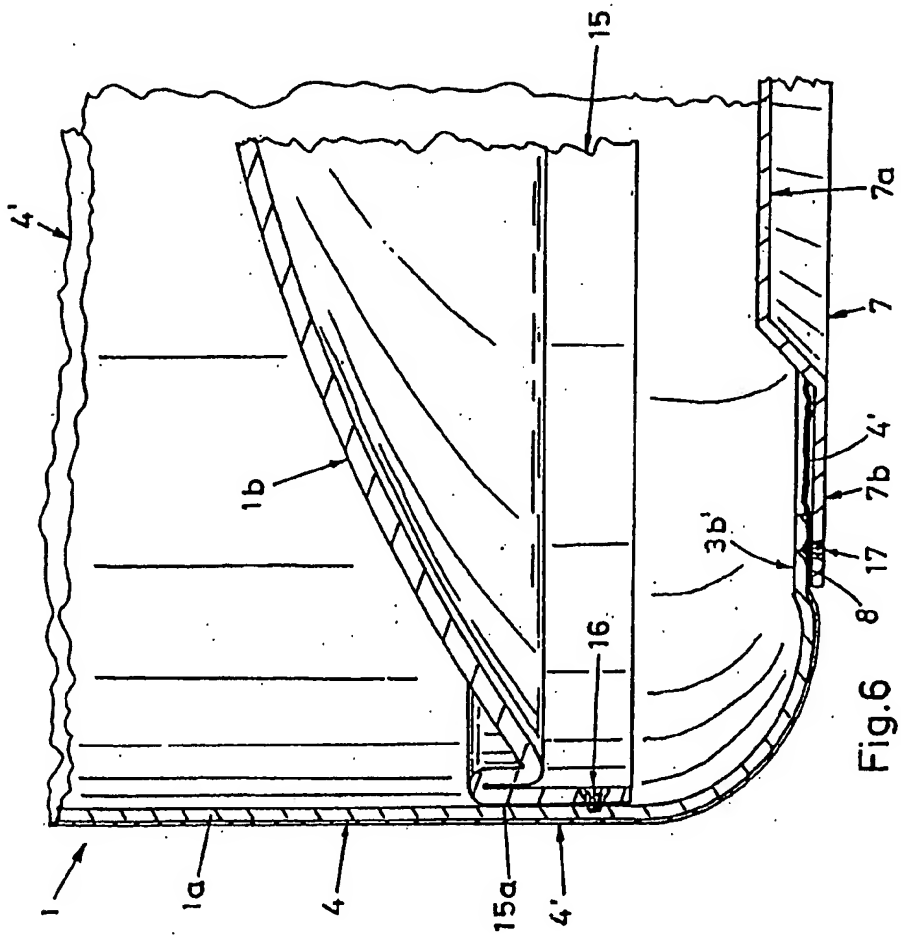


Fig.6

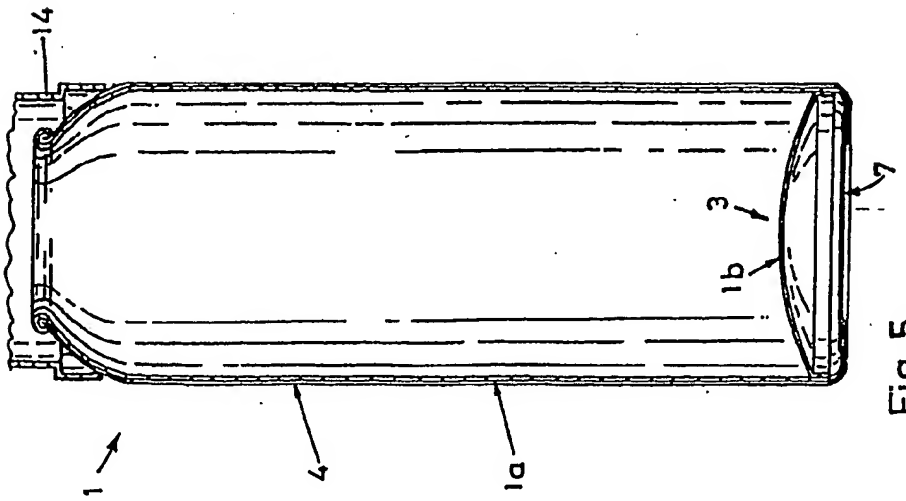


Fig.5

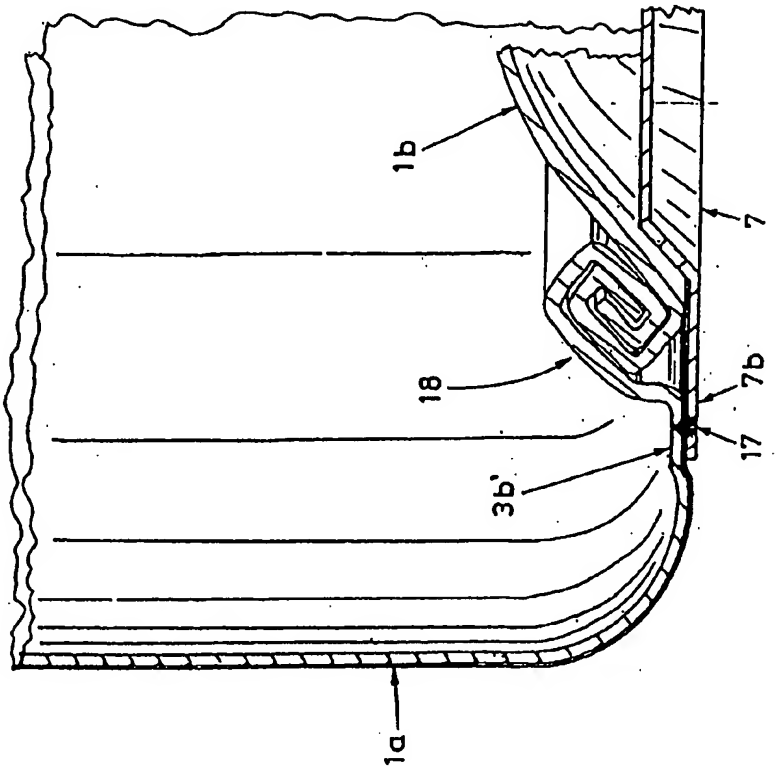


Fig.8

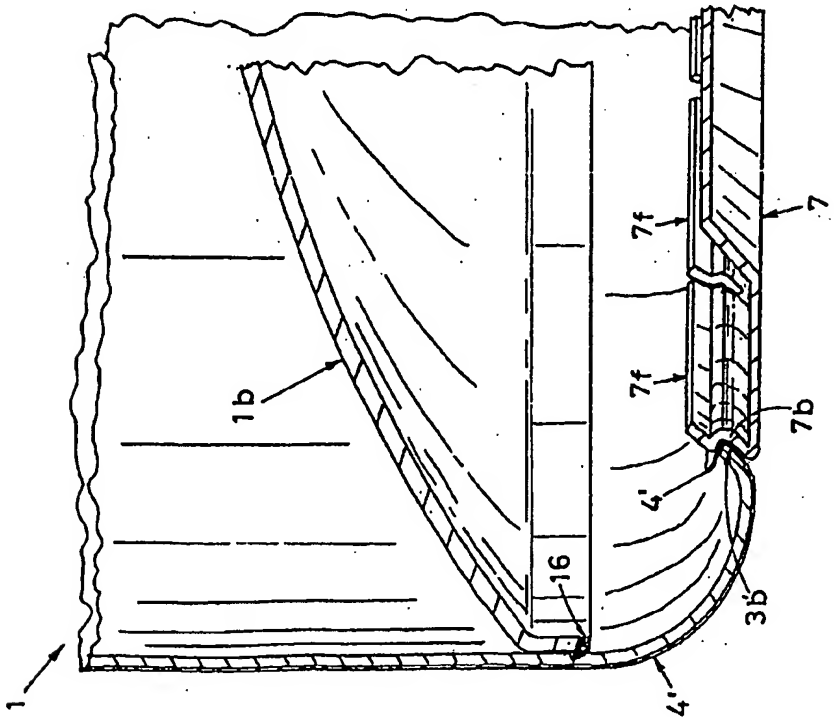


Fig.7

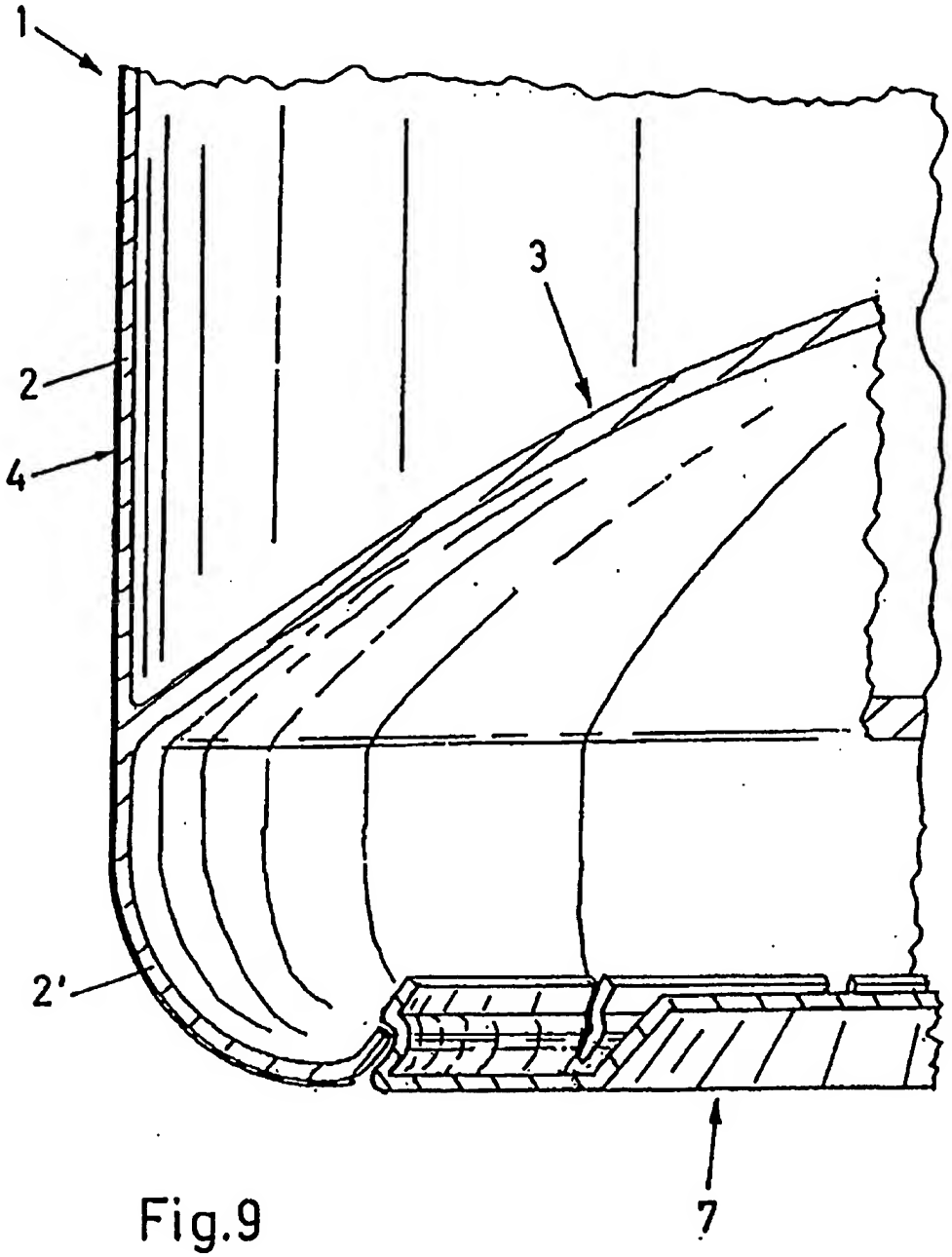


Fig.9

DOSING BODY WITH AN EXTERNAL BASE COVERING, METHOD AND DEVICE FOR APPLYING THE BASE COVERING

[0001] This application is the national phase under 35 U.S.C. § 371 of PCT International Application No. PCT/CH02/000609 which has an International filing date of Nov. 13, 2002, which designated the United States of America and which claims priority on Swiss Patent Application number 158/02 filed Jan. 30, 2002, the entire contents of which are hereby incorporated herein by reference.

FIELD OF THE INVENTION

[0002] The invention generally relates to a can body, to a method and to a device. The invention concerns vessels or cans which include a base on one end face of a jacket-like closed wall, and of which preferably at least one layer of the wall and the base is made of metal.

BACKGROUND OF THE INVENTION

[0003] Vessels may be formed, for example, as aerosol cans or as beverage cans. Further, cans may be made of aluminum as well as of sheet steel. In order to give the vessels a desired appearance and to apply the necessary information, the jacket-like wall is provided with decoration and labeling. The decoration is, for example, directly printed onto the can. If need be, however, the decoration can be printed onto labels or foils that are then applied to the can wall.

[0004] One printing cylinder must be used per color with the current printing method. The printing costs correspondingly increase with each color required. In addition to decorative or graphically configured labelings, standardized information, such as perhaps a bar code, information on hazards and the composition of the product, and if need be promotional information, must also be applied to the can wall. Moreover, a bar code with a dark color, preferably black, must be printed on bright background, preferably white, which strongly impairs the aesthetic effect of the decoration, especially with dark overall surfaces.

[0005] Furthermore, usually two additional colors with the corresponding printing costs are needed for the bar code. Only the precise number of cans that are to be brought into commerce with the current bar code or the current advertising information may be manufactured. In the event that the same can is to reach the market at another point in time with another bar code, then additional cans with the old decoration and the new bar code or new advertising information must be manufactured. If need be, a label with the new bar code can be manufactured, which is glued over the old bar code or the old advertising information, which is associated with much expenditure and is not aesthetically satisfactory.

[0006] It is likewise aesthetically unsatisfactory that in cans having a curved transition region from the can base to the can wall the decoration cannot be printed on in the transition region after the base is formed, which, when the can is standing on its base is manifest as an unsightly or not printed lower edge.

[0007] Due to lower manufacturing costs, today more and more products are being sold in cans made of sheet steel. It has now been found that such sheet steel cans rust on the base, especially when used in wet cells. The cans may stand over long periods of time with their annular support surfaces on a wet surface, or if worst comes to worst, on surfaces that are contaminated with other substances. Moreover, moisture and materials added to this as well as electrical effects can bring about corrosion.

[0008] Even with sheet metals that are provided with a thin chromium layer, undesired oxidation has already been observed. The corrosion leads to a contamination of the surface on which the can is standing, and weakens the base of the can. A weakened can base is dangerous in aerosol cans, especially when butane or propane is used as the propellant gas.

[0009] In order to be able to withstand the pressure in the interior of the can, aerosol cans have a base that is arched toward the can's interior. This base is constructed via a pressing process and includes an inwardly arched central region and a downwardly projecting annular edge region where the can base transitions into the can jacket. The cans stand on the annular edge region that can be weakened by corrosion along the support line so that the central region of the base could break out. With can materials having a thin chromium layer, the chromium layer along the support line can be damaged or eliminated by rubbing motions on conveyor facilities of the filler so that corrosion protection is absent to some extent in the corrosion-endangered edge region. Cans whose bases are connected to the jacket via a fold have a narrow, annular downward standing rim that can be easily damaged or oxidized. Corrosion and possibly other chemical and electrical effects can lead to undesired discolorations of the surface on which the can stands.

[0010] Solutions are known from the publications EP 200 098 A2 and EP 208 564 in which elements of two-part and multiple part cans are joined with laser beams. Here the elements to be joined are arranged butted, overlapping and also running toward one another at right angles. The laser welding seam is formed for example on the end face, penetrating one layer or as a flat-lap weld. The solutions described are not aesthetically attractive and cannot prevent a possible corrosion of the base.

[0011] From U.S. Pat. No. 4,455,850 a beverage can is known in which the central inwardly arched region of the base is coated with a dull color. In this manner, sunlight is prevented from being focused by the concave can base, which could cause a fire to be ignited by cans thrown away outdoors. The coating does not extend over the annular transition region so that the corrosion problem is not solved.

[0012] Moreover, the paint is sprayed onto the flat sheet metal so that when stamping out the sheet metal disks and deep drawing the cans, care must be taken that the applied round paint spots are struck exactly centrally by the stamping tools, which is associated with an increased manufacturing expenditure. Even if the paint were to extend over the annular transition region, the paint layer would no longer be continuous after deep drawing the can and pressing the base. Also, rubbing the transition region on conveyors of filling assemblies would lead to damage of the paint layer. Without a continuous paint layer, the already mentioned danger of corrosion exists once again.

[0013] A beverage can is known from U.S. Pat. No. 5,992,892 in which information is printed on the central

inwardly arched region of the base that is covered with a coating that can be rubbed off in the finished can. This solution makes possible an advertising game in which the buyer of a can can determine, after rubbing off the layer, whether he/she has won anything in accordance with the information lying under it. The annular transition region with the supporting ring thus remains without coating, hence the corrosion problem is not solved. Moreover, the rubbed off coating, or the coating that can be worn off, is not suited for continuously coating the support ring. The removability of the coating is crucial for the promotional game.

[0014] U.S. Pat. No. 6,073,797 discloses a cover that is engageable in connection with the upper end face with the aperture to a beverage can. In order that the top remains locking on the can, an outwardly projecting annular region must be provided on the can end, via which a corresponding elastic annular region of the cover can be inverted until it locks. Such a top is very expensive to manufacture and install. Moreover it cannot be installed on the can base due to the lack of an outwardly projecting annular region.

[0015] A further cover that is installed by screwing only at the opening of a beverage can is known from U.S. Pat. No. 5,711,447. The screw lock of this cover requires outwardly projecting ribs on the beverage can that can interact with inward-standing elements on the cover. The features necessary on the can and on the cover for use of the cover are extremely expensive to manufacture It is also very expensive to screw the cover onto the can. Therefore, the possibility of arranging a promotional article in such a screw lock is associated with an excessive expenditure.

SUMMARY OF THE INVENTION

[0016] An embodiment of the present invention is based upon the task of finding a simple solution for a can that can advantageously be aesthetically configured without being impaired by a bar code or advertising information. In particular, a possible corrosion on the base is to be prevented.

[0017] In one embodiment, it was recognized in accomplishing the objective that corrosion problems and aesthetic problems can both be solved by applying an external covering in the form of a sheet material. The sheet material is fixed in position on an annular connection region of the can body. If the connection is formed along a closed circular line, the membrane-like base covering receives a high level of stability.

[0018] The base covering is basically constructed flat in a main region that is surrounded by the annular connection region and preferably includes the printout of a bar code. If the bar code can be applied on a basically even base surface, then the impairment of the possibility of designing the can wall disappears. No printing rollers for the bar code are necessary for printing the decoration on the can wall. Large amounts of can bodies with an attractive standard decoration on the can wall can be manufactured. Possibly changing information, or information that is not identical for all countries, such as the bar code or even the filling date, and/or aesthetically disturbing information are printed on the base covering. These potentially different base coverings can be printed shortly before the filling time of individual product batches, and can be fixed into position on the standard of the can body. In this way, the same can can be used for all countries and filling batches.

[0019] Because the base covering can be constructed flat in the region of the bar code, the bar code is more readable than a bar code that is applied to a curved can wall. If the coating of the exterior of the can wall extends up to the outer edging of the base covering in the form of at least a paint layer or a decorative foil, then a metallic edge becoming visible on the lower can edge can be prevented. The base covering may cover an annular downward-projecting stand region of the can body, thus preventing the occurrence of corrosion problems.

[0020] The base covering is preferably constructed in the form of a sheet plastic material. It is obvious that sheet material having at least one metal layer, especially an aluminum or steel layer, or even with a cardboard layer, can also be used. Here the stability-imparting layer may also be coated with plastic.

[0021] The sheet materials that are used should guarantee a robust base covering that will not be damaged on the conveyor apparatuses of filling assemblies and also will remain as constant as possible even when standing on wet supports. The aforementioned sheet materials can all be provided with a sealing coating and consequently can be sealed on the base. When metal foils are used, the heat required for the sealing process can also be introduced inductively. A latching connection or a welded connection can also be used instead of a seal connection for fixing the base covering into position, especially with at least three laser welding points.

[0022] It is obvious that the base covering of an embodiment of the invention is not restricted to use in cans. There are also vessels, especially plastic bottles, the bases of which include an annular downward projecting base region and on which consequently a base covering can be fixed. Although there exists no danger of corrosion with plastic vessels, the use of base coverings for the placement of bar codes and advertising information on vessel bases is advantageous.

[0023] If a decorative layer in the form of at least one paint layer, but preferably as a decorative foil, is applied on the exterior of the can wall, then the base covering can be constructed such that the decorative layer extends at least to the outer edging of the base covering. Preferably, however, the decorative layer is somewhat overlapped by the base covering. This prevents foils from being able to loosen on the end region of the can body when decorative foils are used.

[0024] When decorative foils are used, a can body with a can wall and base can be manufactured economically corresponding to the respective requirements. If need be, a decorative foil can be subsequently applied to the can wall so that imprinting the can body can be dispensed with. If the can wall and base are pressed from a single element, as perhaps with aerosol cans made of aluminum or with cans made from steel sheets, then the necessary intensive cleaning and drying for imprinting can be dispensed with. A peeling of the foil can be ruled out with foils closed in the peripheral direction that are overlapped by the base covering. If the can body is assembled from a jacket and a base, these two parts may be joined to one another via a folded seam, but preferably a welded seam, especially a laser welded seam. A decorative foil is preferably applied after this joining step, wherein preferably a close and in particular firm application of the foil on the can body can be guaran-

teed by using a shrinkable foil, especially with a sealing layer that faces the can body. If the can jacket and base are joined using a folded connection, then the folded connection may also be made after the decorative foil is applied, whereby then the folded seam would take over holding the foil on the lower end of the can.

[0025] The base covering, or if need the decorative foil as well, permits a covering of the connection between the jacket and base so that no high aesthetic standards must be imposed on this connection. When a welded seam or laser connection is used, the annular connection region is preferably formed by an end region of the can jacket projecting over the base, wherein this end region is drawn especially somewhat toward the can axis and forms the annular transition region. With a folded seam, this can be constructed in the region of the can base and if need be can be pressed toward the interior of the can such that a curved jacket end region can be used as an annular connection region. With these described variants, a base covering that is fixed into position on the annular connection region bridges the respective connection seam

[0026] In order to produce an aesthetically attractive can body, the transition from the can wall to the base covering is constructed circular segment-like in longitudinal section, whereby it preferably has a curvature radius ranging from 1 to 6 mm, especially basically 3 mm.

[0027] Thanks to the base covering it is now possible, for example, to furnish a two- or three-piece aerosol can of sheet steel that has the appearance of a one-piece aluminum can. The possible embodiments in the base area have already been described above. In order to form the valve seat on the upper end face of the can, a compression necking process can be provided in the case of a two-piece can, and the use of an upper end piece with valve seat in the case of a three-piece can.

[0028] Obviously the invention includes all solutions resulting from the combination of the features and embodiments described. Varying the features includes, for example, choosing between one-, two- or three-piece cans, with two- and multiple-piece cans, the choice of various modes of connection between the parts, providing or omitting a decorative foil, the choice of a specific base covering and its fastening on the can body as well as the selection of material for the can and the base covering. Even unexpected combinations can lead to advantageous solutions. Thus, for example, a one-piece aluminum can with a base covering that includes magnetizable sheet steel has the advantage that this can can be conveyed via magnetic conveyors while using magnetic forces of adhesion with various axis alignments.

[0029] The possibility of clamping a decorative foil firmly on the lower can end with the base covering opens up a many sided use of decorative foils. These foils are imprinted when needed on their exterior, but preferably on the side facing the can body. The printed layer is protected with a transparent foil that is imprinted on the reverse side, or on the side facing the can body, so that no friction-conditioned impairments of the decoration can arise. A transparent foil printed on the reverse side can be provided with a sealing layer after imprinting through the printed layer, which also guarantees a seal connection between the foil and the can body. In order to be able to shrink the foil on the can body, a piece of foil is shaped in a first step into a closed foil jacket and joined together on the two side lines allocated to each other, whereby preferably a seal connection is created. This foil jacket has a slightly greater cross section than the can body and can thus be inverted over the can body and shrunk on the latter as well as sealed fast with the application of heat. After applying the decorative foil, the base covering is fixed into position such that it somewhat overlaps the foil end on the base. It is obvious that the base covering can also be constructed annularly so that it holds the end of the foil securely on the can body but does not completely cover the can base.

[0030] Applying foils to a can body is known, for example, from EP 1 153 837 A1, wherein however there with each foil segment, the printed layer may not be applied up to the foil edge, respectively a blank foil edge is needed. In accordance with this known solution, a sealing layer arranged between the foil and the printed layer must lie open when constructing the closed foil jacket to generate a sealing seam. Therefore the imprinting and the succeeding cutting of the foil track must be exactly harmonized with each other, which is not attainable with simple expenditure with a thin foil due to its elastic deformability. In this connection the present invention provides a simplification. Because a sealing layer is applied to the printed layer, the printed layer can be constructed continuously. Cutting the pieces of foil need not precisely agree with the printing, and the formation of a sealing seam is always guaranteed.

[0031] A sufficiently shrinkable foil can guarantee that the decorative foil lies free from folds on the body after the shrinking process in the drawn-in base region, and if need be also in a drawn-in upper end region. Because weld seams and especially laser connections can be constructed such that the surface of the can body is basically smooth even in the region of the seam, it can no longer be recognized after applying the decorative foil and the base covering that the can body was brought into the desired shape using seams. With cylindrical can bodies, a rectangular sheet is shaped into a can jacket with a longitudinal seam. But it would also be possible to assemble the can jacket out of two or more jacket pieces with two or more longitudinal seams so that if need be a jacket deviating from the cylindrical shape arises. The deviation from a circular cylindrical shape can arise in the cross section as well as in the longitudinal direction.

[0032] In order to be able to hold a decorative foil extremely securely on the can body even on the upper end of the can, an annular covering element is also provided there. This upper covering element is formed in connection with aerosol cans if need be from a sub-region of the valve or from a part fastened onto the valve seat. It is obvious that it can also be fixed in position on the upper end of the can analogously to the base covering through a seal connection, a latching connection or a welding connection, especially with at least three laser welding points, wherein this part covers the upper foil end and therewith protects it from tearing off.

[0033] Covering the foil end on at least one end of the can, especially below, makes it possible to dispense with cutting the foil or foil jacket exactly to size in the direction of the axis of the can without in this way an unsightly end being able to make an appearance. Moreover, folds that could form on strongly necked end regions are covered by the base covering and/or by the annular covering element.

[0034] Embodiments should also be included in which the base covering lies directly on the base with a surface adapted to the shape of the base and is in particular sprayed directly on the base as an injection molded component.

[0035] The solution of the embodiments of the invention opens up new configuration possibilities for cans. Moreover, simplifications in can manufacturing result, allowing the cans to be assembled directly at the filling site. This has the advantage that the space-consuming transport of empty cans from a facility for manufacturing cans to the various filling facilities can be dispensed with. The cans are, for example, assembled from a flat sheet metal piece from which the jacket is formed, from a base component, an upper end component, and a base covering, along with a decorative foil. The base elements, the upper end elements and the base coverings can be stacked with little free space and can consequently be transported in a space-saving manner like stacks of pieces of sheet metal and foil rolls.

BRIEF DESCRIPTION OF THE DRAWINGS

[0036] Further advantages, features and details of the invention will become evident from the description of illustrated exemplary embodiments given hereinbelow and the accompanying drawings, which are given by way of illustration only and thus are not limitative of the present invention, wherein:

[0037] **FIG. 1** illustrates a vertical section through an aerosol can in accordance with the state of the art,

[0038] **FIG. 2** Illustrates a cutaway of a vertical section through an aerosol can with a base covering,

[0039] **FIG. 3** Illustrates a cutaway of a vertical section through an aerosol can with a base covering and an advertising article **FIG. 4** illustrates a vertical section through an aerosol can and a device for applying a base covering,

[0040] **FIG. 5** Illustrates a vertical section through an aerosol can with a base covering, wherein the can body is assembled from three parts,

[0041] **FIG. 6** Illustrates a detailed cutaway from the base region of a can in accordance with **FIG. 5** with a base covering that is fixed into position using a sealing or welding connection,

[0042] **FIG. 7** Illustrates a detailed cutaway of a can with a base covering that is fixed into position using a latching connection,

[0043] **FIG. 8** Illustrates a detailed cutaway of a can with a base covering, wherein can base and jacket are connected through a folded connection, and

[0044] **FIG. 9** Illustrates a detailed cutaway of a one piece can with a base covering that is fixed in position using a latching connection.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0045] **FIG. 1** illustrates a can body **1** in accordance with the state of the art with a jacket-like closed can wall **2** and a base **3** on the lower end face of the can wall **2**. This is an aerosol can whose base **3** is arched with a central region **3***a* against the can interior. A downwardly projecting annular edge region **3***b* is formed around the central region **3***a*. The cans stand on a support line of the annular edge region **3***b* wherein the support line can be weakened by corrosion so that the central region **3***a* can break out. The can wall and the base include a metal layer **5**. A decorative layer **4** is arranged on the exterior of the can wall **2** or at the metal layer **5** that extends from a valve seat **6** through a conified neck and the predominant region of the can wall **2** up to the transition wall from the can wall **2** to the base **3**. An uncoated can region is visible beneath the lower edging of the decorative layer **4**.

[0046] **FIG. 2** shows a preferred embodiment of an aerosol can **1** with an external base covering **7** in the form of a plastic sheet material that is fixed to a downward projecting annular edge region **3***b* of the base **3** with a seal connection **8**. The edge region **3***b* consequently forms a connection region on which the base covering **7** is fixed into position. The base covering **7** includes a contact region **7***b* that lies on the edge region **3***b*. The seal connection **8** extends at least over a sub-region of the contact region **7***b* and is preferably formed by a sealing layer arranged on the base covering **7** that was sealed by a sealing apparatus to the edge region **3***b*. It is obvious that the connection between the edge region **3***b* and the contact region **7***b* can also be attained with an adhesive.

[0047] The decorative layer **4** can be constructed as a coating on the exterior of the can wall **2** in the form of at least one layer of paint as well as in the form of a decorative foil. The decorative layer **4** extends preferably at least up to the outer edging of the base covering **7**. In the embodiment represented, the decorative layer **4** is somewhat overlapped by the base covering **7**. In this way, the metal layer **5** can be prevented from being accessible in the base region. A danger of corrosion is consequently ruled out. The flat sheet material of the base covering **7** has a layer thickness of at least 0.02 mm, preferably, however, in the range from 0.08 to 0.8 mm, especially from 0.2 to 0.6 mm. In this way, the strength necessary for different mechanical stresses can be guaranteed.

[0048] The base covering **7** includes a main region **7***a*, surrounded by the contact region **7***b* or by the inner edging of the seal connection, that is basically constructed flat and in particular includes the printout of a bar code. The base covering **7** includes a tear-apart device if need be that is constructed somewhat in the form of a weakened tear apart line in the main region **7***a*. By tearing along the tear-apart line using a strap, a part of the main region **7***a* of the can can be removed or at least swung out. Winning information can be applied on the interior surface of this element that becomes accessible via the tearing. A base covering **7** that can be torn off enables effects that permit advertising.

[0049] **FIG. 3** illustrates a base covering **7** with a first and a second covering element surface **7***c* and **7***d*, wherein the first covering element surface **7***c* is connected via the seal connection **8** with the edge region **3***b* of the base **3**, and the second covering element surface **7***d* is fixed into position separably on the first covering element surface **7***c*. In order to be able to separate the covering surface **7***d*, a grasping strip **7***e*, for example, is constructed on the covering element surface **7***d*. If the first covering element surface **7***c* has an opening in the central region, an advertising article **9** arranged between the central region **3***a* of the base **3** and the base covering **7** can be removed after separating the second covering element surface **7***d*. The base covering **7** makes

possible numerous advertising effects. The covering subsurface *7d* can, for example, be constructed as a collection piece that has on the one side a motif or an image and if need be a designation for it on the other side. The advertising article **9** and/or the covering subsurface *7d* can include collection points, good luck sayings or even recipes. If beverages are poured into the can body, a beverage additive, such as perhaps vitamins, alcohol, stimulants or sweeteners, may be arranged in the hollow space between can base and the base covering instead of the advertising article. It would also be advantageous to sell medications directly with water, wherein the medication would be arranged between the can base and the base covering of the vessel with the water.

[0050] **FIG. 4** shows a device with which the base covering **7** can be sealed fast to the downward projecting annular edge region *3b* of the base **3**. The device includes a retaining apparatus for retaining the can body and a sealing apparatus **10** with an annular sealing surface *10a* that is adapted to the edge region *3b* of the base **3**. In order to heat the sealing surface *10a* to a desired temperature, the sealing surface *10a* is allocated a heating device *10b*. The heating apparatus must be constructed such that the sealing surface *10a* is movable relative to the base **3**. In the embodiment represented, the retaining apparatus includes a centering apparatus **11** that extends ring-like around the sealing apparatus **10** for accommodation of the can base **3** and a hold down apparatus **12** that in interaction with the sealing apparatus **10** makes attainable the desired contact pressure between the base covering **7** and the base **3** of the can body **1**. In order that the base covering **7** does not need to be moved by the heated sealing apparatus **10** to the base **3**, the sealing apparatus **10** preferably includes a feeding apparatus **13** that is movable relative to the sealing surface *10a*.

[0051] In accommodating a base covering **7** that can if necessary be fed in from the side, the feeding apparatus **13** is arranged over the sealing surface *10a*. After a can body **1** is inserted into the centering apparatus **11**, the base covering **7** is moved by the feeding apparatus **13** toward the base **3**. Subsequently the annular sealing surface *10a* presses the contact region *7b* against the edge region *3b* until the heat administered has attained the desired sealing connection **8**. It is obvious that the retaining apparatus and the sealing apparatus can be configured in accordance with solutions from the state of the art. In particular, it would also be possible to provide a retaining device that retains the can body solely from an end face and/or holds the latter with the base upward.

[0052] In order to implement the sealing connection between the can base and the base covering, at least one processing station is provided, which preferably includes a rotary table, to which is allocated sealing apparatuses rotating along with it. In this manner, the sealing can be conducted during the rotary motion of the rotary table. Such a processing station can, for example, be arranged in the filling operation before or after filling.

[0053] **FIG. 5** shows the can body **1** of an aerosol can **1**, wherein the can body **1** is assembled from a jacket element *1a* and a base element *1b*. The view of the connection between the base element *1b* and the jacket element *1a* is covered by the base covering **7**. The jacket element *1a* is provided with a decorative layer **4** that if necessary can be printed directly onto the cylindrical can body. If the jacket element *1a* is made out of a sheet of metal by transformation and application of a welded seam, then the decorative layer **4** can also be previously printed upon the flat metal sheet. A valve seat is constructed at the upper end of the can body **1** by die necking and transforming the opening into a valve seat. If need be, a decorative foil is shrunk on directly after the necking, basically extending to the end corner of the jacket element *1a* so that the end of the foil is clamped after transforming by the transformed can edge.

[0054] If the decorative layer **4**, especially the decorative foil, does not extend to the upper edge of the can, an upper covering element **14** can be arranged on the upper end of the can, at least covering the can end region without decorative layer. If the can body is made of three parts, an upper end piece with the valve seat must be fixed into position on the jacket element *1a*. In accordance with the state of the art, this is done with a folded seam or if need be via welding (EP 208 564 B1). The unattractive seam region thereby arising between the upper end element and the jacket element *1a* can be covered by the upper covering element **14**. In the case of an aerosol can, the upper covering element **14** is an element that is connected to the valve and always rests on the can following insertion of the valve. By providing covering elements **7**, **14**, three-piece cans can be furnished in which the consumer cannot recognize that the can body **1** is composed of various parts. Basically all known types of connection for tightly connecting can elements can be used.

[0055] In the embodiment in accordance with **FIG. 5**, the base element *1b* is connected via an annular welding connection to the jacket element *1a*. On the base, an edge region of the base element *1b* extends along the jacket element *1a* adjacent to the lower edge of the jacket element *1a*. The welding connection can be made in the form of a fillet seam or also in the contact region of these two elements by penetrating one element. It is obvious that the elements can also be butt welded, that at least one of the two connections could be constructed as a folded connection, or that a connection is provided only below or only above. Without using an upper end piece, the jacket element *1a* must be strongly necked to form a valve seat, which is for various materials associated with great expenditure, especially with many die necking steps, and in the worst case with insurmountable problems. Due to the covering possibility, an optimized assembly of the can body can be selected without it appearing negative in appearance.

[0056] If the can body is provided with a decorative foil, the base covering **7** and if necessary also the upper covering element **14**, can be used to protect or firmly clamp the lower or upper foil edge. In this way, the danger of a decorative foil loosening can be substantially reduced. Even welded seams in the longitudinal direction of the can can be covered with a decorative foil. A can jacket that is formed by bending and welding, especially laser welding, can already receive a special shape by cutting the assembled elements to size. Because the material of the at least one metallic sheet material shaped into the jacket is not hardened by transformation steps, the jacket can at least be transformed regionally by altering the periphery. In this way, aesthetically attractive cans can be formed that can be provided with a shrinking decorative foil before or if necessary after transformation. Consequently, new configuration possibilities result.

[0057] **FIG. 6** shows a cutaway from a can body **1** in which a base element **1***b* is permanently welded to the jacket element **1***a*, projecting upward, dome-like. A welded connection **16** is formed between an annular region **15** and a peripheral line of the jacket element **1***a* that, for example, extends through the annular region **15** to the jacket element **1***a* and is preferably generated via laser welding. With aerosol cans, the can interior must accommodate an increased pressure. A fold-like strengthening of the annular region **15** prevents a detachment of the base element **1***b* from the jacket element **1***a*. With an impermissibly high internal pressure, the arching of the base element **1***b* can deform toward the outside and thus indicate the excess pressure as well as prevent a bursting. The base covering **7** includes a main region **7***a* surrounded by the contact region **7***b* that is preferably constructed basically flat and can in particular accommodate the printout of a bar code. In the embodiment represented, the contact region **7***b* is fixed in position on a corresponding annular connection region **3***b*' on the lower end of the jacket element **1***a*. An adhesive or seal connection **8**, for example, can be provided for fixing into position. If the material of the contact region **7***b* includes metal, the connection can also be guaranteed by weld points **17**, for example at least three laser welding points.

[0058] In the represented embodiment, a decorative layer **4** in the form of a decorative foil **4**' is situated on the exterior of the can body **1**. The decorative foil **4**' is shrunk fast before the base covering **7** is fixed into position on the can body **1**. The lower edge of the decorative foil **4**' need not be exactly cut to size because it is covered by the base covering **7**. It extends at least somewhat into the connection region **3***b*', but can also project somewhat over the edge of the jacket element **1***a*. The seal connection must consequently be at least partially constructed between the exterior of the decorative foil **4**' and the contact region **7***b* with a sealed connection between the contact region **7***b* and the connection region **3***b*'. The decorative foil **4**' should thus adhere sufficiently well to the connection region **3***b*' For this, sealing layers are present approximately in the connection region on both sides of the decorative foil, which guarantee a fast connection due to the sealing process. The transition from the jacket element **1***a* or from the can wall **2** to the base covering **7** is constructed in the form of a circular segment in longitudinal segment or is drawn in toward the interior and preferably has a curvature radius ranging from 1 to 6 mm, especially basically 3 mm. This radius permits in comparison to corners an unimpeded conveyance even over short steps. If need be, the base covering **7** forms a base wherein a standing can body **1** is only in contact with the support surface through the base covering **7**.

[0059] **FIG. 7** shows an embodiment in which the base element **1***b* is fastened to the jacket element **1***a* via a welded seam **16** in the form of a fillet seam. The base covering **7** is fixed into position with a latching connection on the lower edge region of the jacket element **1***a*. The connection region **3***b*' is formed by the lower and free edge region of the jacket element **1***a*. The contact region **7***b* of the base covering **7** lies form-locking on the connection region **3***b*' and is preferably formed by spring lips **7***f*, so that the base covering **7** can be inserted under spring deformation of the spring lips **7***f* on the underside of the can body **1**. The decorative foil **4**' extends between the jacket element **1***a* and the base element **1***b* over the connection region **3***b*' and is consequently clamped fast on the can body **1** by the base covering **7**.

[0060] Because it is possible to omit a seal or welded connection, the base covering **7** does not need to be sealable or weldable. Consequently, any desired plastics or even metals, especially coated and/or magnetic metals, can be used to manufacture the base covering. The spring lips **7***f* can be constructed in any desired form and are provided at least at three points basically equally spaced in the peripheral direction. Because positioning a latching element without a sealing or welding device can be conducted by a single linear motion of a pressing element, the method as well as the device for fixing a latching base covering in position are extremely simple.

[0061] **FIG. 8** shows an embodiment in which the base element **1***b* is joined to the jacket element **1***a* via a folded connection **18**. The folded connection **18** is preferably so constructed and deformed toward the interior of the can that the transition from jacket element **1***a* or from the can wall **2** to the base element **1***a* is in the form of a circular segment in the longitudinal section and includes a connection region **3***b*' for fixing the base covering **7** in place. A sealing or welding connection is constructed between the connection region **3***b*' and the contact region **7***b* for fixing the base covering. The folded connection **18** is covered over by the base covering **7**. If necessary a decorative foil **4**' extends along the jacket element **1***a* up to under the contact region **7***b*.

[0062] **FIG. 9** shows an embodiment in which a can body **1** was constructed using pressing, especially cold impact pressing, such that the base **3** transitions into the upright standing can wall **2** and into a wall segment **2**' standing downward. The can wall **2** together with the wall segment **2**' will form a cylindrical jacket surface directly after pressing that can, which surface for example, can be imprinted with a decorative layer **4**. The wall segment **2**' is somewhat drawn in, in order to be able to fix the base covering thereon. In the embodiment represented, the decorative layer extends basically up to the base covering. That means that the entire region of the can body **1** visible from the side has a decoration. If necessary a foil that extends up to beneath the base covering is provided. If the can body is made of aluminum, then a can body that can be conveyed using magnetic conveyors can be furnished by inserting a base covering **7** with magnetizable metal.

[0063] Exemplary embodiments being thus described, it will be obvious that the same may be varied in many ways. Such variations are not to be regarded as a departure from the spirit and scope of the present invention, and all such modifications as would be obvious to one skilled in the art are intended to be included within the scope of the following claims.

1. Can body, comprising: a jacket-like closed can wall extending around an axis of the can; and a base constructed on one end of the can wall, wherein at least in one sub-region of the base, an external base covering is constructed in the form of a sheet material and is fixed—into position on an annular connection region of the can body, a decorative layer is constructed on the exterior of the can wall in the form of at least one paint layer and wherein the decorative layer extends at least to the outer edging of the base covering.

2. Can body according to claim 1, wherein the decorative layer is somewhat overlapped by the base covering.

3. Can body according to claim 1, wherein at least one layer of the can wall and the base is made of metal.

4. Can body according to claim 1, wherein the can walls and the base are at least one of made from a single piece and joined to one another via a seam.

5. Can body according to claim 1, wherein at least one of a sealed connection, a latching connection, and a welded connection is constructed between the base covering and the can body.

6. Can body according to claim 1, wherein the base covering is fixed into position on the base, on one end region of the can wall projecting over the base that is somewhat drawn in toward the axis of the can, wherein the transition from the can wall to the annular connection region is constructed in the form of a circular segment.

7. Can body according to claim 1, wherein the base covering forms a standing region, and wherein a standing can body is only in contact with a support surface through the base covering.

8. Can body—according to claim 1, wherein the base covering is constructed basically flat in a main region that is surrounded by the annular connection region.

9. Can body according to claim 1, wherein the base covering includes tear apart device in the form of a first and a second covering subsurface, wherein the first covering subsurface is joined with the base via the seal connection and the second covering subsurface is fixed separably into position on the first covering subsurface.

10. Can body according to claim 1, wherein a hollow space, especially for accommodating an advertising article, is constructed between the base covering and the base.

11. Method for applying a base covering in connection with the base of a can body with a can wall that extends like a jacket around the axis of the can, and a base constructed on one end of the can wall, wherein at least one layer of the can wall and the base is made of metal and a decorative layer is constructed on the exterior of the can wall in the form of at least one paint layer, comprising:

fixing the base covering in the form of a sheet material into position on an annular connection region of the can body and wherein after said fixing, the decorative layer extends at least to the outer edging of the base covering.

12. Method according to claim 11, wherein, before the base covering is fixed into place, the can wall and the base are joined to one another via a seam, and the end region of the can wall that projects over the base is, if necessary, somewhat drawn in against the can axis.

13. Method according to claim 11, wherein, before the base covering is fixed into position, a decorative foil is arranged on the exterior of the can wall and an end region of the decorative foil is covered over by the base covering when the base covering is being fixed into position.

14. Device for applying an external base covering on a base of a can body that includes a closed can wall that extends like a jacket around an axis of the can, a base that is constructed on the one end of the can wall and a decorative layer constructed on the exterior of the can wall in the form of at least one paint layer, the device comprising:

a retaining apparatus for retaining the can wall, wherein the retaining device holds the base of a retained can body free, and a position fixing apparatus makes the base covering movable toward the base and able to be fixed into position there, wherein after said fixing, the decorative layer extends at least to the outer edging of the base covering.

15. Device according to claim 14, wherein the position fixing apparatus comprises a feeding apparatus for feeding a base covering to the base of a can body held by the retaining apparatus, and includes at least one of a sealing apparatus, a pressing apparatus and, a welding device.

Device according to claim 14, wherein the retaining apparatus includes a centering apparatus for accommodating the base and a hold down apparatuses, wherein the hold down apparatus, in interaction with the position fixing apparatus, makes a

16. desired contact force attainable between the base covering and the annular connection region of the can body.

17. Can body according to claim 1, wherein a decorative layer includes a decorative foil.

18. Can body according to claim 1, wherein the base covering is at least partially made of metal.

19. Can body according to claim 1, wherein the base covering is at least partially made of plastic.

20. Can body according to claim 1, wherein the base covering has a layer thickness of at least 0.02 mm.

21. Can body according to claim 1, wherein the base covering has a layer thickness in the region from 0.08 to 0.8 mm

22. Can body according to claim 1, wherein the base covering has a layer thickness in the region from 0.2 to 0.6 mm.

23. Can body according to claim 1, wherein the can wall and the base are joined to one another via a welded seam.

24. Can body according to claim 1, wherein the can wall and the base are joined to one another via a laser welded seam.

25. Can body according to claim 6, wherein the transition from the can wall to the annular connection region is constructed with a curvature radius in the range from 1 to 6 mm

26. Can body according to claim 25, wherein the curvature radius is basically 3 mm.

27. Can body according to claim 8, wherein the base covering includes an imprintable region.

28. Can body according to claim 1, wherein a hollow space, for accommodating an advertising article, is constructed between the base covering and the base.

29. Can body according to claim 1, wherein the base covering, with a surface adapted to the shape of the base, lies directly on the base.

30. Can body according to claim 29, wherein the base covering is sprayed directly onto the base as an injection molded component.

31. Method according to claim 12, wherein the can wall and the base are joined to one another via a welded seam.

32. Method according to claim 12, wherein the can wall and the base are joined to one another via a laser welded seam.

33. Device according to claim 15, wherein the retaining apparatus includes a centering apparatus for accommodating the base and a hold down apparatus, wherein the hold down apparatus, in interaction with the position fixing apparatus, makes a desired contact force attainable between the base covering and the annular connection region of the can body.

34. Can body according to claim 8, wherein the base covering includes an imprintable region including a bar code.

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(54) METHOD AND DEVICE FOR PRODUCING A CAN BODY AND CAN BODY THEREBY PRODUCED

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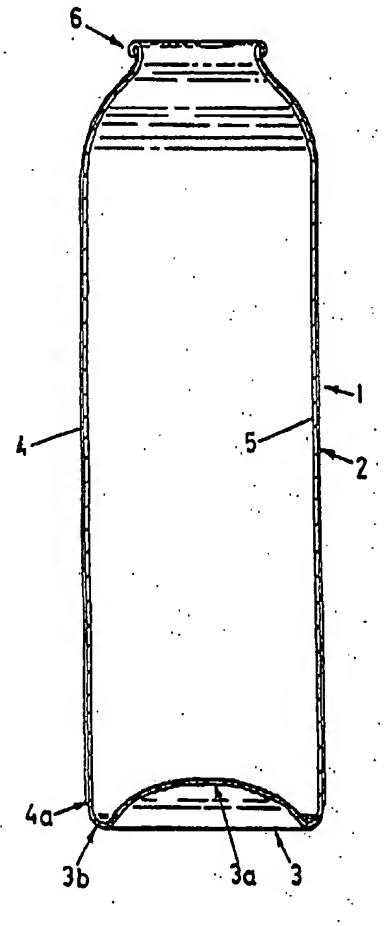
(57) ABSTRACT

A can body with a jacket-like closed wall and a base constructed on one end of the can wall includes an external base covering in the form of a sheet material. The base covering is fixed into position on an annular connection region of the can body. The base covering can form a basically flat imprintable region in a main region that is surrounded by the connection region. If a bar code can be applied in this imprintable region, then a restriction of the configuration possibility of the can wall disappears. The base covering can form a stand region whereby a standing can body is only in contact with the support surface if necessary via the base covering, and consequently the occurrence of corrosion problems is prevented. A retaining device that leaves the base of a held can body free and a position fixing apparatus are used for fixing the base covering into position. A decorative foil on the exterior of the can wall can be overlapped by the base covering, which serves to prevent a detachment of the decorative foil on the base.



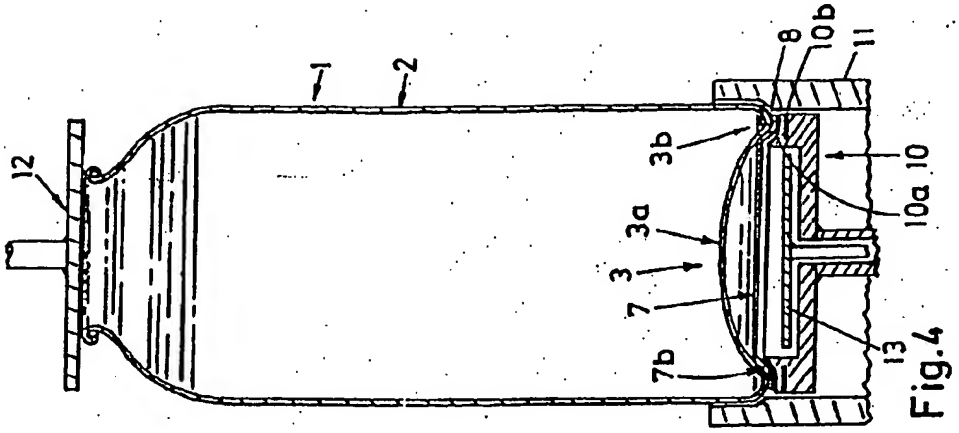


Fig.4

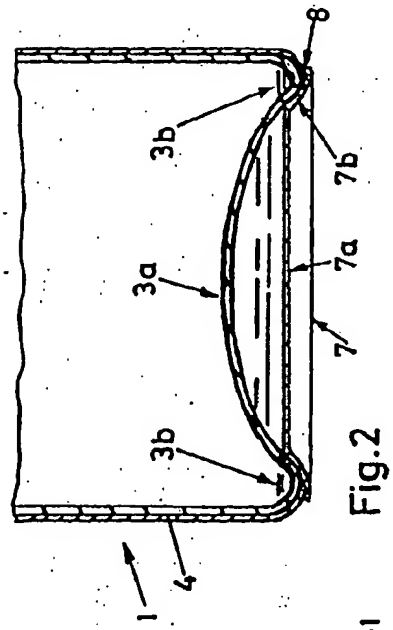


Fig.2

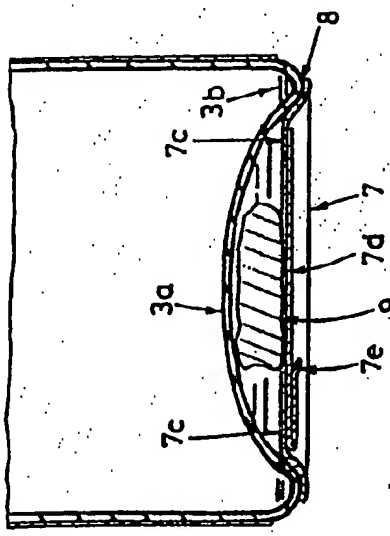


Fig.3

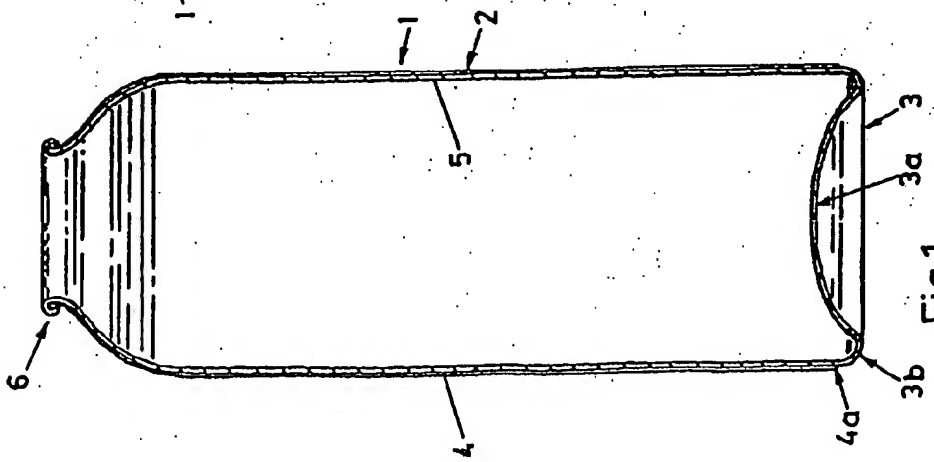


Fig.1

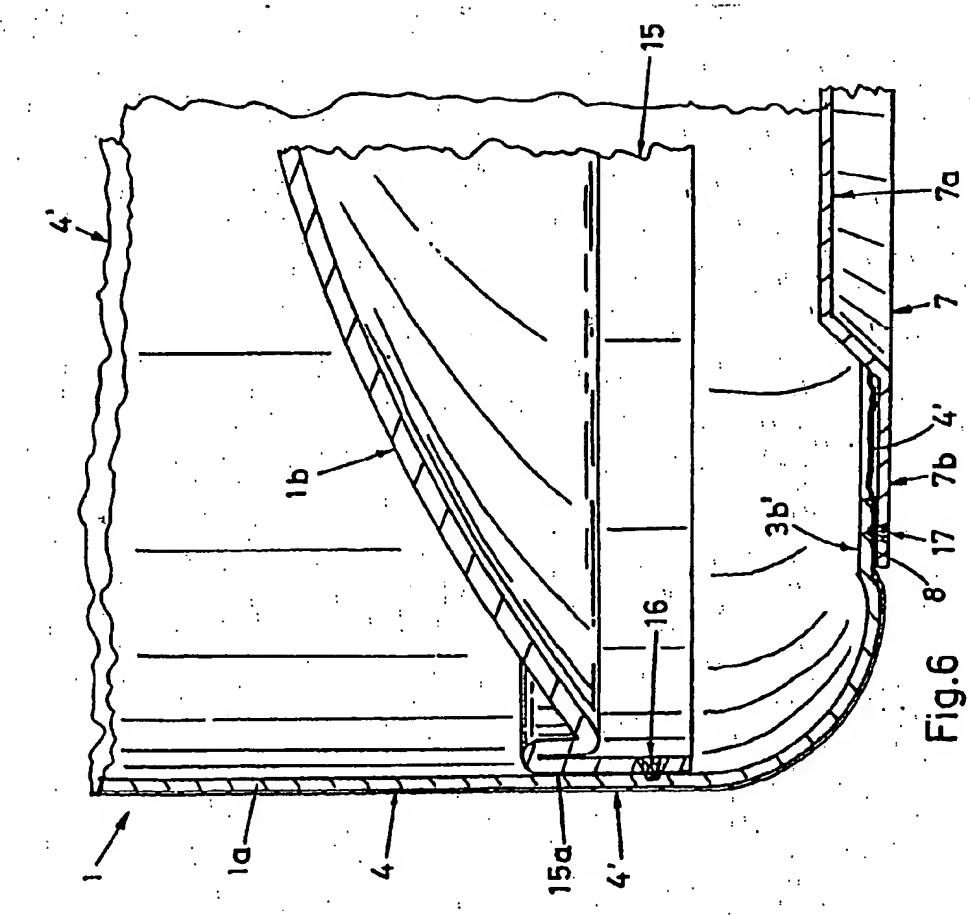


Fig.6

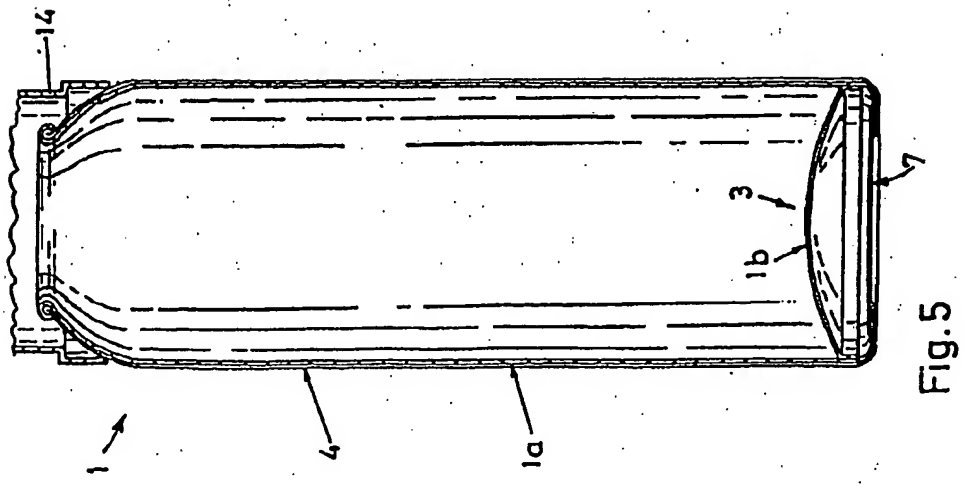


Fig.5

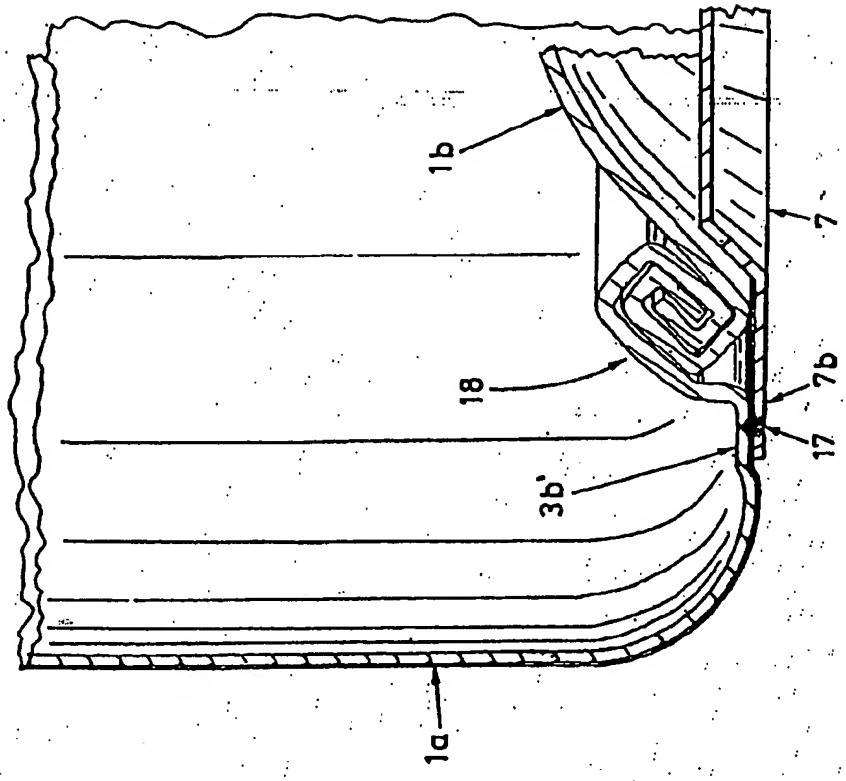


Fig.8

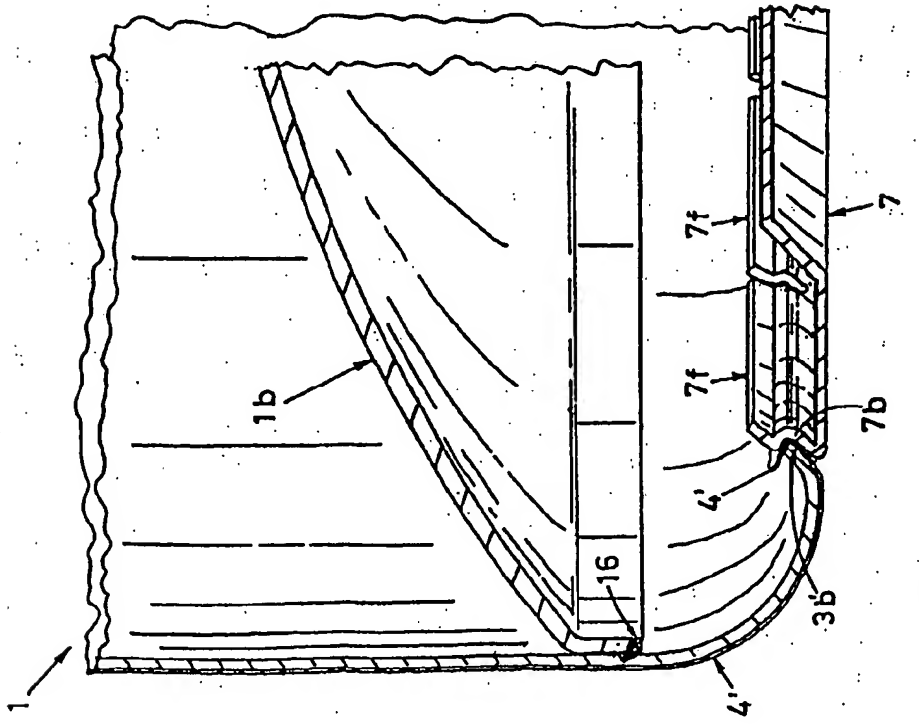


Fig.7

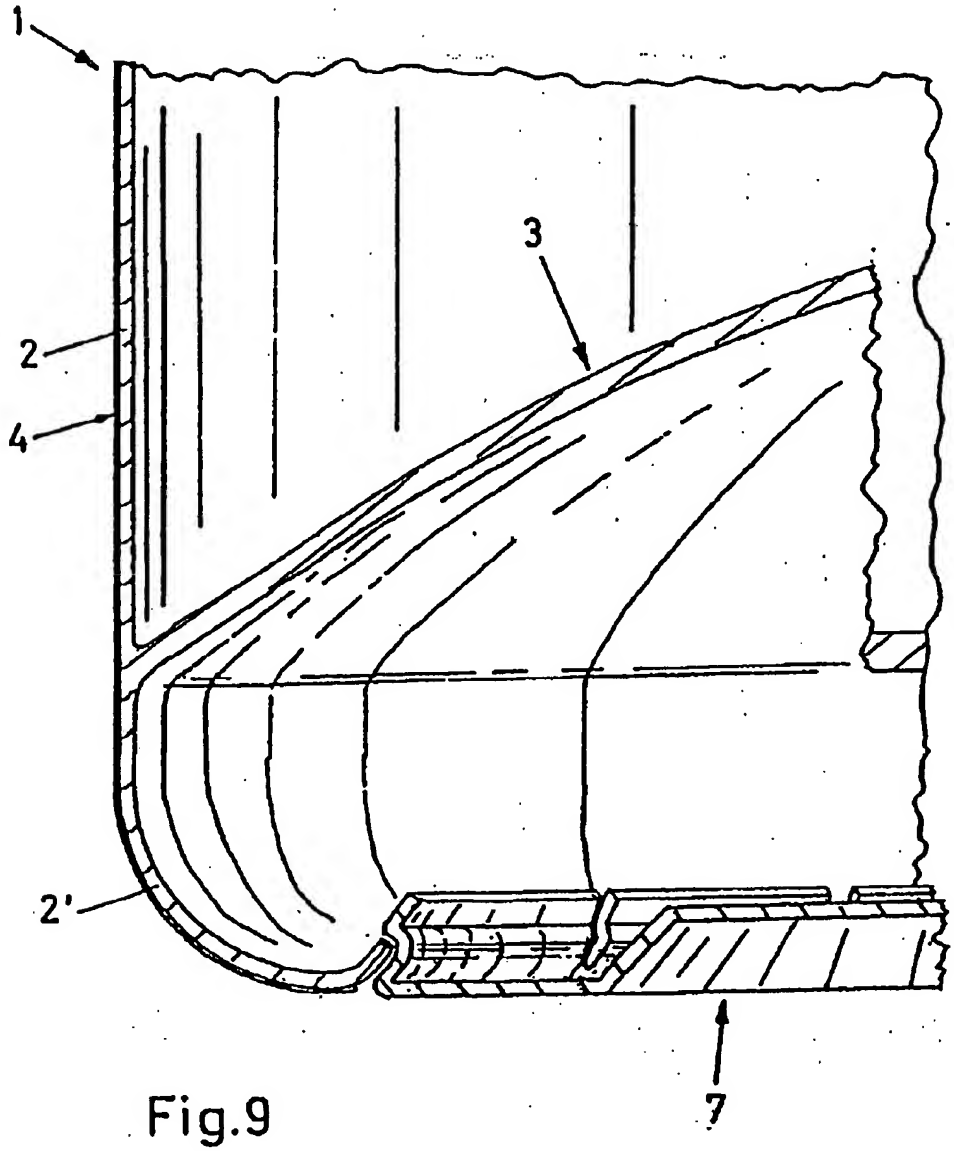


Fig.9

METHOD AND DEVICE FOR PRODUCING A CAN BODY AND CAN BODY THEREBY PRODUCED

[0001] This application is the national phase under 35 U.S.C. § 371 of PCT International Application No. PCT/CH02/000609 which has an International filing date of Nov. 13, 2002, which designated the United States of America and which claims priority on Swiss Patent Application number 158/02 filed Jan. 30, 2002, the entire contents of which are hereby incorporated herein by reference.

FIELD OF THE INVENTION

[0002] The invention generally relates to a can body, to a method and to a device. The invention concerns vessels or cans which include a base on one end face of a jacket-like closed wall, and of which preferably at least one layer of the wall and the base is made of metal.

BACKGROUND OF THE INVENTION

[0003] Vessels may be formed, for example, as aerosol cans or as beverage cans. Further, cans may be made of aluminum as well as of sheet steel. In order to give the vessels a desired appearance and to apply the necessary information, the jacket-like wall is provided with decoration and labeling. The decoration is, for example, directly printed onto the can. If need be, however, the decoration can be printed onto labels or foils that are then applied to the can wall.

[0004] One printing cylinder must be used per color with the current printing method. The printing costs correspondingly increase with each color required. In addition to decorative or graphically configured labelings, standardized information, such as perhaps a bar code, information on hazards and the composition of the product, and if need be promotional information, must also be applied to the can wall. Moreover, a bar code with a dark color, preferably black, must be printed on a bright background, preferably white, which strongly impairs the aesthetic effect of the decoration, especially with dark overall surfaces.

[0005] Furthermore, usually two additional colors with the corresponding printing costs are needed for the bar code. Only the precise number of cans that are to be brought into commerce with the current bar code or the current advertising information may be manufactured. In the event that the same can is to reach the market at another point in time with another bar code, then additional cans with the old decoration and the new bar code or new advertising information must be manufactured. If need be, a label with the new bar code can be manufactured, which is glued over the old bar code or the old advertising information, which is associated with much expenditure and is not aesthetically satisfactory.

[0006] It is likewise aesthetically unsatisfactory that in cans having a curved transition region from the can base to the can wall the decoration cannot be printed on in the transition region after the base is formed, which, when the can is standing on its base is manifest as an unsightly or not printed lower edge.

[0007] Due to lower manufacturing costs, today more and more products are being sold in cans made of sheet steel. It has now been found that such sheet steel cans rust on the base, especially when used in wet cells. The cans may stand over long periods of time with their annular support surfaces on a wet surface, or if worst comes to worst, on surfaces that are contaminated with other substances. Moreover, moisture and materials added to this as well as electrical effects can bring about corrosion.

[0008] Even with sheet metals that are provided with a thin chromium layer, undesired oxidation has already been observed. The corrosion leads to a contamination of the surface on which the can is standing, and weakens the base of the can. A weakened can base is dangerous in aerosol cans, especially when butane or propane is used as the propellant gas.

[0009] In order to be able to withstand the pressure in the interior of the can, aerosol cans have a base that is arched toward the can's interior. This base is constructed via a pressing process and includes an inwardly arched central region and a downwardly projecting annular edge region where the can base transitions into the can jacket. The cans stand on the annular edge region that can be weakened by corrosion along the support line so that the central region of the base could break out. With can materials having a thin chromium layer, the chromium layer along the support line can be damaged or eliminated by rubbing motions on conveyor facilities of the filler so that corrosion protection is absent to some extent in the corrosion-endangered edge region. Cans whose bases are connected to the jacket via a fold have a narrow, annular downward standing rim that can be easily damaged or oxidized. Corrosion and possibly other chemical and electrical effects can lead to undesired discolorations of the surface on which the can stands.

[0010] Solutions are known from the publications EP 200 098 A2 and EP 208 564 in which elements of two-part and multiple part cans are joined with laser beams. Here the elements to be joined are arranged butted, overlapping and also running toward one another at right angles. The laser welding seam is formed for example on the end face, penetrating one layer or as a flat-lap weld. The solutions described are not aesthetically attractive and cannot prevent a possible corrosion of the base.

[0011] From U.S. Pat. No. 4,455,850 a beverage can is known in which the central inwardly arched region of the base is coated with a dull color. In this manner, sunlight is prevented from being focused by the concave can base, which could cause a fire to be ignited by cans thrown away outdoors. The coating does not extend over the annular transition region so that the corrosion problem is not solved.

[0012] Moreover, the paint is sprayed onto the flat sheet metal so that when stamping out the sheet metal disks and deep drawing the cans, care must be taken that the applied round paint spots are struck exactly centrally by the stamping tools, which is associated with an increased manufacturing expenditure. Even if the paint were to extend over the annular transition region, the paint layer would no longer be continuous after deep drawing the can and pressing the base. Also, rubbing the transition region on conveyors of filling assemblies would lead to damage of the paint layer. Without a continuous paint layer, the already mentioned danger of corrosion exists once again.

[0013] A beverage can is known from U.S. Pat. No. 5,992,892 in which information is printed on the central inwardly arched region of the base that is covered with a

coating that can be rubbed off in the finished can. This solution makes possible an advertising game in which the buyer of a can can determine, after rubbing off the layer, whether he/she has won anything in accordance with the information lying under it. The annular transition region with the supporting ring thus remains without coating, hence the corrosion problem is not solved. Moreover, the rubbed off coating, or the coating that can be worn off, is not suited for continuously coating the support ring. The removability of the coating is crucial for the promotional game.

[0014] U.S. Pat. No. 6,073,797 discloses a cover that is engageable in connection with the upper end face with the aperture to a beverage can. In order that the top remains locking on the can, an outwardly projecting annular region must be provided on the can end, via which a corresponding elastic annular region of the cover can be inverted until it locks. Such a top is very expensive to manufacture and install. Moreover it cannot be installed on the can base due to the lack of an outwardly projecting annular region.

[0015] A further cover that is installed by screwing only at the opening of a beverage can is known from U.S. Pat. No. 5,711,447. The screw lock of this cover requires outwardly projecting ribs on the beverage can that can interact with inward-standing elements on the cover. The features necessary on the can and on the cover for use of the cover are extremely expensive to manufacture It is also very expensive to screw the cover onto the can. Therefore, the possibility of arranging a promotional article in such a screw lock is associated with an excessive expenditure.

SUMMARY OF THE INVENTION

[0016] An embodiment of the present invention is based upon the task of finding a simple solution for a can that can advantageously be aesthetically configured without being impaired by a bar code or advertising information. In particular, a possible corrosion on the base is to be prevented.

[0017] In one embodiment, it was recognized in accomplishing the objective that corrosion problems and aesthetic problems can both be solved by applying an external covering in the form of a sheet material. The sheet material is fixed in position on an annular connection region of the can body. If the connection is formed along a closed circular line, the membrane-like base covering receives a high level of stability.

[0018] The base covering is basically constructed flat in a main region that is surrounded by the annular connection region and preferably includes the printout of a bar code. If the bar code can be applied on a basically even base surface, then the impairment of the possibility of designing the can wall disappears. No printing rollers for the bar code are necessary for printing the decoration on the can wall. Large amounts of can bodies with an attractive standard decoration on the can wall can be manufactured. Possibly changing information, or information that is not identical for all countries, such as the bar code or even the filling date, and/or aesthetically disturbing information are printed on the base covering. These potentially different base coverings can be printed shortly before the filling time of individual product batches, and can be fixed into position on the standard of the can body. In this way, the same can can be used for all countries and filling batches.

[0019] Because the base covering can be constructed flat in the region of the bar code, the bar code is more readable than a bar code that is applied to a curved can wall. If the coating of the exterior of the can wall extends up to the outer edging of the base covering in the form of at least a paint layer or a decorative foil, then a metallic edge becoming visible on the lower can edge can be prevented. The base covering may cover an annular downward-projecting stand region of the can body, thus preventing the occurrence of corrosion problems.

[0020] The base covering is preferably constructed in the form of a sheet plastic material. It is obvious that sheet material having at least one metal layer, especially ar, aluminum or steel layer, or even with a cardboard layer, can also be used. Here the stability-imparting layer may also be coated with plastic.

[0021] The sheet materials that are used should guarantee a robust base covering that will not be damaged on the conveyor apparatuses of filling assemblies and also will remain as constant as possible even when standing on wet supports. The aforementioned sheet materials can all be provided with a sealing coating and consequently can be sealed on the base. When metal foils are used, the heat required for the sealing process can also be introduced inductively. A latching connection or a welded connection can also be used instead of a seal connection for fixing the base covering into position, especially with at least three laser welding points.

[0022] It is obvious that the base covering of an embodiment of the invention is not restricted to use in cans. There are also vessels, especially plastic bottles, the bases of which include an annular downward projecting base region and on which consequently a base covering can be fixed. Although there exists no danger of corrosion with plastic vessels, the use of base coverings for the placement of bar codes and advertising information on vessel bases is advantageous.

[0023] If a decorative layer in the form of at least one paint layer, but preferably as a decorative foil, is applied on the exterior of the can wall, then the base covering can be constructed such that the decorative layer extends at least to the outer edging of the base covering. Preferably, however, the decorative layer is somewhat overlapped by the base covering. This prevents foils from being able to loosen on the end region of the can body when decorative foils are used.

[0024] When decorative foils are used, a can body with a can wall and base can be manufactured economically corresponding to the respective requirements. If need be, a decorative foil can be subsequently applied to the can wall so that imprinting the can body can be dispensed with. If the can wall and base are pressed from a single element, as perhaps with aerosol cans made of aluminum or with cans made from steel sheets, then the necessary intensive cleaning and drying for imprinting can be dispensed with. A peeling of the foil can be ruled out with foils closed in the peripheral direction that are overlapped by the base covering. If the can body is assembled from a jacket and a base, these two parts may be joined to one another via a folded seam, but preferably a welded seam, especially a laser welded seam. A decorative foil is preferably applied after this joining step, wherein preferably a close and in particular firm application of the foil on the can body can be guaran-

teed by using a shrinkable foil, especially with a sealing layer that faces the can body. If the can jacket and base are joined using a folded connection, then the folded connection may also be made after the decorative foil is applied, whereby then the folded seam would take over holding the foil on the lower end of the can.

[0025] The base covering, or if need the decorative foil as well, permits a covering of the connection between the jacket and base so that no high aesthetic standards must be imposed on this connection. When a welded seam or laser connection is used, the annular connection region is preferably formed by an end region of the can jacket projecting over the base, wherein this end region is drawn especially somewhat toward the can axis and forms the annular transition region. With a folded seam, this can be constructed in the region of the can base and if need be can be pressed toward the interior of the can such that a curved jacket end region can be used as an annular connection region. With these described variants, a base covering that is fixed into position on the annular connection region bridges the respective connection seam

[0026] In order to produce an aesthetically attractive can body, the transition from the can wall to the base covering is constructed circular segment-like in longitudinal section, whereby it preferably has a curvature radius ranging from 1 to 6 mm, especially basically 3 mm.

[0027] Thanks to the base covering it is now possible, for example, to furnish a two- or three-piece aerosol can of sheet steel that has the appearance of a one-piece aluminum can. The possible embodiments in the base area have already been described above. In order to form the valve seat on the upper end face of the can, a compression necking process can be provided in the case of a two-piece can, and the use of an upper end piece with valve seat in the case of a three-piece can.

[0028] Obviously the invention includes all solutions resulting from the combination of the features and embodiments described. Varying the features includes, for example, choosing between one-, two- or three-piece cans, with two- and multiple-piece cans, the choice of various modes of connection between the parts, providing or omitting a decorative foil, the choice of a specific base covering and its fastening on the can body as well as the selection of material for the can and the base covering. Even unexpected combinations can lead to advantageous solutions. Thus, for example, a one-piece aluminum can with a base covering that includes magnetizable sheet steel has the advantage that this can can be conveyed via magnetic conveyors while using magnetic forces of adhesion with various axis alignments.

[0029] The possibility of clamping a decorative foil firmly on the lower can end with the base covering opens up a many sided use of decorative foils. These foils are imprinted when needed on their exterior, but preferably on the side facing the can body. The printed layer is protected with a transparent foil that is imprinted on the reverse side, or on the side facing the can body, so that no friction-conditioned impairments of the decoration can arise. A transparent foil printed on the reverse side can be provided with a sealing layer after imprinting through the printed layer, which also guarantees a seal connection between the foil and the can body. In order to be able to shrink the foil on the can body a piece of foil is shaped in a first step into a closed foil jacket and joined together on the two side lines allocated to each other, whereby preferably a seal connection is created. This foil jacket has a slightly greater cross section than the can body and can thus be inverted over the can body and shrunk on the latter as well as sealed fast with the application of heat. After applying the decorative foil, the base covering is fixed into position such that it somewhat overlaps the foil end on the base. It is obvious that the base covering can also be constructed annularly so that it holds the end of the foil securely on the can body but does not completely cover the can base.

[0030] Applying foils to a can body is known, for example, from EP 1 153 837 A1, wherein however there with each foil segment, the printed layer may not be applied up to the foil edge, respectively a blank foil edge is needed. In accordance with this known solution, a sealing layer arranged between the foil and the printed layer must lie open when constructing the closed foil jacket to generate a sealing seam. Therefore the imprinting and the succeeding cutting of the foil track must be exactly harmonized with each other, which is not attainable with simple expenditure with a thin foil due to its elastic deformability. In this connection the present invention provides a simplification. Because a sealing layer is applied to the printed layer, the printed layer can be constructed continuously. Cutting the pieces of foil need not precisely agree with the printing, and the formation of a sealing seam is always guaranteed.

[0031] A sufficiently shrinkable foil can guarantee that the decorative foil lies free from folds on the body after the shrinking process in the drawn-in base region, and if need be also in a drawn-in upper end region. Because weld seams and especially laser connections can be constructed such that the surface of the can body is basically smooth even in the region of the seam, it can no longer be recognized after applying the decorative foil and the base covering that the can body was brought into the desired shape using seams. With cylindrical can bodies, a rectangular sheet is shaped into a can jacket with a longitudinal seam. But it would also be possible to assemble the can jacket out of two or more jacket pieces with two or more longitudinal seams so that if need be a jacket deviating from the cylindrical shape arises. The deviation from a circular cylindrical shape can arise in the cross section as well as in the longitudinal direction.

[0032] In order to be able to hold a decorative foil extremely securely on the can body even on the upper end of the can, an annular covering element is also provided there. This upper covering element is formed in connection with aerosol cans if need be from a sub-region of the valve or from a part fastened onto the valve seat. It is obvious that it can also be fixed in position on the upper end of the can analogously to the base covering through a seal connection, a latching connection or a welding connection, especially with at least three laser welding points, wherein this part covers the upper foil end and therewith protects it from tearing off.

[0033] Covering the foil end on at least one end of the can, especially below, makes it possible to dispense with cutting the foil or foil jacket exactly to size in the direction of the axis of the can without in this way an unsightly end being able to make an appearance. Moreover, folds that could form on strongly necked end regions are covered by the base covering and/or by the annular covering element.

[0034] Embodiments should also be included in which the base covering lies directly on the base with a surface adapted to the shape of the base and is in particular sprayed directly on the base as an injection molded component.

[0035] The solution of the embodiments of the invention opens up new configuration possibilities for cans. Moreover, simplifications in can manufacturing result, allowing the cans to be assembled directly at the filling site. This has the advantage that the space-consuming transport of empty cans from a facility for manufacturing cans to the various filling facilities can be dispensed with. The cans are, for example, assembled from a flat sheet metal piece from which the jacket is formed, from a base component, an upper end component, and a base covering, along with a decorative foil. The base elements, the upper end elements and the base coverings can be stacked with little free space and can consequently be transported in a space-saving manner like stacks of pieces of sheet metal and foil rolls.

BRIEF DESCRIPTION OF THE DRAWINGS

[0036] Further advantages, features and details of the invention will become evident from the description of illustrated exemplary embodiments given hereinbelow and the accompanying drawings, which are given by way of illustration only and thus are not limitative of the present invention, wherein:

[0037] **FIG. 1** illustrates a vertical section through an aerosol can in accordance with the state of the art,

[0038] **FIG. 2** Illustrates a cutaway of a vertical section through an aerosol can with a base covering,

[0039] **FIG. 3** Illustrates a cutaway of a vertical section through an aerosol can with a base covering and an advertising article

[0040] **FIG. 4** illustrates a vertical section through an aerosol can and a device for applying a base covering,

[0041] **FIG. 5** Illustrates a vertical section through an aerosol can with a base covering, wherein the can body is assembled from three parts,

[0042] **FIG. 6** Illustrates a detailed cutaway from the base region of a can in accordance with **FIG. 5** with a base covering that is fixed into position using a sealing or welding connection,

[0043] **FIG. 7** Illustrates a detailed cutaway of a can with a base covering that is fixed into position using a latching connection,

[0044] **FIG. 8** Illustrates a detailed cutaway of a can with a base covering, wherein can base and jacket are connected through a folded connection, and

[0045] **FIG. 9** Illustrates a detailed cutaway of a one piece can with a base covering that is fixed in position using a latching connection.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0046] **FIG. 1** illustrates a can body **1** in accordance with the state of the art with a jacket-like closed can wall **2** and a base **3** on the lower end face of the can wall **2**. This is an aerosol can whose base **3** is arched with a central region **3***a* against the can interior. A downwardly projecting annular edge region **3***b* is formed around the central region **3***a*. The cans stand on a support line of the annular edge region **3***b* wherein the support line can be weakened by corrosion so that the central region **3***a* can break out. The can wall and the base include a metal layer **5**. A decorative layer **4** is arranged on the exterior of the can wall **2** or at the metal layer **5** that extends from a valve seat **6** through a conified neck and the predominant region of the can wall **2** up to the transition wall from the can wall **2** to the base **3**. An uncoated can region is visible beneath the lower edging of the decorative layer **4**.

[0047] **FIG. 2** shows a preferred embodiment of an aerosol can **1** with an external base covering **7** in the form of a plastic sheet material that is fixed to a downward projecting annular edge region **3***b* of the base **3** with a seal connection **8**. The edge region **3***b* consequently forms a connection region on which the base covering **7** is fixed into position. The base covering **7** includes a contact region **7***b* that lies on the edge region **3***b*. The seal connection **8** extends at least over a sub-region of the contact region **7***b* and is preferably formed by a sealing layer arranged on the base covering **7** that was sealed by a sealing apparatus to the edge region **3***b*. It is obvious that the connection between the edge region **3***b* and the contact region **7***b* can also be attained with an adhesive.

[0048] The decorative layer **4** can be constructed as a coating on the exterior of the can wall **2** in the form of at least one layer of paint as well as in the form of a decorative foil. The decorative layer **4** extends preferably at least up to the outer edging of the base covering **7**. In the embodiment represented, the decorative layer **4** is somewhat overlapped by the base covering **7**. In this way, the metal layer **5** can be prevented from being accessible in the base region. A danger of corrosion is consequently ruled out. The flat sheet material of the base covering **7** has a layer thickness of at least 0.02 mm, preferably, however, in the range from 0.08 to 0.8 mm, especially from 0.2 to 0.6 mm. In this way, the strength necessary for different mechanical stresses can be guaranteed.

[0049] The base covering **7** includes a main region **7***a*, surrounded by the contact region **7***b* or by the inner edging of the seal connection, that is basically constructed flat and in particular includes the printout of a bar code. The base covering **7** includes a tear-apart device if need be that is constructed somewhat in the form of a weakened tear apart line in the main region **7***a*. By tearing along the tear-apart line using a strap, a part of the main region **7***a* of the can can be removed or at least swung out. Winning information can be applied on the interior surface of this element that becomes accessible via the tearing. A base covering **7** that can be torn off enables effects that permit advertising.

[0050] **FIG. 3** illustrates a base covering **7** with a first and a second covering element surface **7***c* and **7***d*, wherein the first covering element surface **7***c* is connected via the seal connection **8** with the edge region **3***b* of the base **3**, and the second covering element surface **7***d* is fixed into position separably on the first covering element surface **7***c*. In order to be able to separate the covering surface **7***d*, a grasping strip **7***e*, for example, is constructed on the covering element surface **7***d*. If the first covering element surface **7***c* has an opening in the central region, an advertising article **9** arranged between the central region **3***a* of the base **3** and the

base covering **7** can be removed after separating the second covering element surface *7d*. The base covering **7** makes possible numerous advertising effects. The covering subsurface *7d* can, for example, be constructed as a collection piece that has on the one side a motif or an image and if need be a designation for it on the other side. The advertising article **9** and/or the covering subsurface *7d* can include collection points, good luck sayings or even recipes. If beverages are poured into the can body, a beverage additive, such as perhaps vitamins, alcohol, stimulants or sweeteners, may be arranged in the hollow space between can base and the base covering instead of the advertising article. It would also be advantageous to sell medications directly with water, wherein the medication would be arranged between the can base and the base covering of the vessel with the water.

[0051] **FIG. 4** shows a device with which the base covering **7** can be sealed fast to the downward projecting annular edge region *3b* of the base **3**. The device includes a retaining apparatus for retaining the can body and a sealing apparatus **10** with an annular sealing surface *10a* that is adapted to the edge region *3b* of the base **3**. In order to heat the sealing surface *10a* to a desired temperature, the sealing surface *10a* is allocated a heating device *10b*. The heating apparatus must be constructed such that the sealing surface *10a* is movable relative to the base **3**. In the embodiment represented, the retaining apparatus includes a centering apparatus **11** that extends ring-like around the sealing apparatus **10** for accommodation of the can base **3** and a hold down apparatus **12** that in interaction with the sealing apparatus **10** makes attainable the desired contact pressure between the base covering **7** and the base **3** of the can body **1**. In order that the base covering **7** does not need to be moved by the heated sealing apparatus **10** to the base **3**, the sealing apparatus **10** preferably includes a feeding apparatus **13** that is movable relative to the sealing surface *10a*.

[0052] In accommodating a base covering **7** that can if necessary be fed in from the side, the feeding apparatus **13** is arranged over the sealing surface *10a*. After a can body **1** is inserted into the centering apparatus **11**, the base covering **7** is moved by the feeding apparatus **13** toward the base **3**. Subsequently the annular sealing surface *10a* presses the contact region *7b* against the edge region *3b* until the heat administered has attained the desired sealing connection **8**S It is obvious that the retaining apparatus and the sealing apparatus can be configured in accordance with solutions from the state of the art. In particular, it would also be possible to provide a retaining device that retains the can body solely from an end face and/or holds the latter with the base upward.

[0053] In order to implement the sealing connection between the can base and the base covering, at least one processing station is provided, which preferably includes a rotary table, to which is allocated sealing apparatuses rotating along with it. In this manner, the sealing can be conducted during the rotary motion of the rotary table. Such a processing station can, for example, be arranged in the filling operation before or after filling.

[0054] **FIG. 5** shows the can body **1** of an aerosol can **1**, wherein the can body **1** is assembled from a jacket element *1a* and a base element *1b*. The view of the connection between the base element *1b* and the jacket element *1a* is covered by the base covering **7**. The jacket element *1a* is provided with a decorative layer **4** that if necessary can be printed directly onto, the cylindrical can body. If the jacket element *1a* is made out of a sheet of metal by transformation and application of a welded seam, then the decorative layer **4** can also be previously printed upon the flat metal sheet. A valve seat is constructed at the upper end of the can body **1** by die necking and transforming the opening into a valve seat. If need be, a decorative foil is shrunk on directly after the necking, basically extending to the end corner of the jacket element *1a* so that the end of the foil is clamped after transforming by the transformed can edge.

[0055] If the decorative layer **4**, especially the decorative foil, knot extend to the upper edge of the can, an upper covering element **14** can be arranged on the upper end of the can, at least covering the can end region without decorative layer. If the can body is made of three parts, an upper end piece with the valve seat must be fixed into position on the jacket element *1a*. In accordance with the state of the art, this is done with a folded seam or if need be via welding (EP 208 564 B1). The unattractive seam region thereby arising between the upper end element and the jacket element *1a* can be covered by the upper covering element **14**. In the case of an aerosol can, the upper covering element **14** is an element that is connected to the valve and always rests on the can following insertion of the valve. By providing covering elements **7**, **14**, three-piece cans can be furnished in which the consumer cannot recognize that the can body **1** is composed of various parts. Basically all known types of connection for tightly connecting can elements can be used.

[0056] In the embodiment in accordance with **FIG. 5**, the base element *1b* is connected via an annular welding connection to the jacket element *1a*. On the base, an edge region of the base element *1b* extends along the jacket element *1a* adjacent to the lower edge of the jacket element *1a*. The welding connection can be made in the form of a fillet seam or also in the contact region of these two elements by penetrating one element. It is obvious that the elements can also be butt welded, that at least one of the two connections could be constructed as a folded connection, or that a connection is provided only below or only above. Without using an upper end piece, the jacket element *1a* must be strongly necked to form a valve seat, which is for various materials associated with great expenditure, especially with many die necking steps, and in the worst case with insurmountable problems. Due to the covering possibility, an optimized assembly of the can body can be selected without it appearing negative in appearance.

[0057] If the can body is provided with a decorative foil, the base covering **7** and if necessary also the upper covering element **14**, can be used to protect or firmly clamp the lower or upper foil edge. In this way, the danger of a decorative foil loosening can be substantially reduced. Even welded seams in the longitudinal direction of the can can be covered with a decorative foil. A can jacket that is formed by bending and welding, especially laser welding, can already receive a special shape by cutting the assembled elements to size. Because the material of the at least one metallic sheet material shaped into the jacket is not hardened by transformation steps, the jacket can at least be transformed regionally by altering the periphery. In this way, aesthetically attractive cans can be formed that can be provided with a shrinking decorative foil before or if necessary after transformation. Consequently, new configuration possibilities result.

[0058] **FIG. 6** shows a cutaway from a can body **1** in which a base element *1b* is permanently welded to the jacket element *1a*, projecting upward, dome-like. A welded connection **16** is formed between an annular region **15** and a

peripheral line of the jacket element 1*a* that, for example, extends through the annular region **15** to the jacket element 1*a* and is preferably generated via laser welding. With aerosol cans, the can interior must accommodate an increased pressure. A fold-like strengthening of the annular region **15** prevents a detachment of the base element 1*b* from the jacket element 1*a*. With an impermissibly high internal pressure, the arching of the base element 1*b* can deform toward the outside and thus indicate the excess pressure as well as prevent a bursting. The base covering **7** includes a main region 7*a* surrounded by the contact region 7*b* that is preferably constructed basically flat and can in particular accommodate the printout of a bar code. In the embodiment represented, the contact region 7*b* is fixed in position on a corresponding annular connection region 3*b*' on the lower end of the jacket element 1*a*. An adhesive or seal connection **8**, for example, can be provided for fixing into position. If the material of the contact region 7*b* includes metal, the connection can also be guaranteed by weld points **17**, for example at least three laser welding points.

[0059] In the represented embodiment, a decorative layer **4** in the form of a decorative foil **4**, is situated on the exterior of the can body **1**. The decorative foil **4**' is shrunk fast before the base covering **7** is fixed into position on the can body **1**. The lower edge of the decorative foil **4**' need not be exactly cut to size because it is covered by the base covering **7**. It extends at least somewhat into the connection region 3*b*', but can also project somewhat over the edge of the jacket element 1*a*. The seal connection must consequently be at least partially constructed between the exterior of the decorative foil **4**' and the contact region 7*b* with a sealed connection between the contact region 7*b* and the connection region 3*b*'. The decorative foil **4**' should thus adhere sufficiently well to the connection region 3*b*' For this, sealing layers are present approximately in the connection region on both sides of the decorative foil, which guarantee a fast connection due to the sealing process. The transition from the jacket element 1*a* or from the can wall **2** to the base covering **7** is constructed in the form of a circular segment in longitudinal segment or is drawn in toward the interior and preferably has a curvature radius ranging from 1 to 6 mm, especially basically 3 mm. This radius permits in comparison to corners an unimpeded conveyance even over short steps. If need be, the base covering **7** forms a base wherein a standing can body **1** is only in contact with the support surface through the base covering **7**.

[0060] **FIG. 7** shows an embodiment in which the base element 1*b* is fastened to the jacket element 1*a* via a welded seam **16** in the form of a fillet seam. The base covering **7** is fixed into position with a latching connection on the lower edge region of the jacket element 1*a*. The connection region 3*b*' is formed by the lower and free edge region of the jacket element 1*a*. The contact region 7*b* of the base covering **7** lies form-locking on the connection region 3*b*' and is preferably formed by spring lips 7*f*, so that the base covering **7** can be inserted under spring deformation of the spring lips 7*f* on the underside of the can body **1**. The decorative foil **4**' extends between the jacket element 1*a* and the base element 1*b* over the connection region 3*b*' and is consequently clamped fast on the can body **1** by the base covering **7**.

[0061] Because it is possible to omit a seal or welded connection, the base covering **7** does not need to be sealable or weldable. Consequently, any desired plastics or even metals, especially coated and/or magnetic metals, can be used to manufacture the base covering. The spring lips 7*f* can be constructed in any desired form and are provided at least at three points basically equally spaced in the peripheral direction. Because positioning a latching element without a sealing or welding device can be conducted by a single linear motion of a pressing element, the method as well as the device for fixing a latching base covering in position are extremely simple.

[0062] **FIG. 8** shows an embodiment in which the base element 1*b* is joined to the jacket element 1*a* via a folded connection **18**. The folded connection **18** is preferably so constructed and deformed toward the interior of the can that the transition from jacket element 1*a* or from the can wall **2** to the base element 1*a* is in the form of a circular segment in the longitudinal section and includes a connection region 3*b*' for fixing the base covering **7** in place. A sealing or welding connection is constructed between the connection region 3*b*' and the contact region 7*b* for fixing the base covering. The folded connection **18** is covered over by the base covering **7**. If necessary a decorative foil **4**' extends along the jacket element 1*a* up to under the contact region 7*b*.

[0063] **FIG. 9** shows an embodiment in which a can body **1** was constructed using pressing, especially cold impact pressing, such that the base **3** transitions into the upright standing can wall **2** and into a wall segment **2**' standing downward. The can wall **2** together with the wall segment **2**' will form a cylindrical jacket surface directly after pressing that can, which surface for example, can be imprinted with a decorative layer **4**. The wall segment **2**' is somewhat drawn in, in order to be able to fix the base covering thereon. In the embodiment represented, the decorative layer extends basically up to the base covering. That means that the entire region of the can body **1** visible from the side has a decoration. If necessary a foil that extends up to beneath the base covering is provided. If the can body is made of aluminum, then a can body that can be conveyed using magnetic conveyors can be furnished by inserting a base covering **7** with magnetizable metal.

[0064] Exemplary embodiments being thus described, it will be obvious that the same may be varied in many ways. Such variations are not to be regarded as a departure from the spirit and scope of the present invention, and all such modifications as would be obvious to one skilled in the art are intended to be included within the scope of the following claims.

1. Can body, comprising a jacket-like closed can wall extending around an axis of the can; and a base constructed on one end of the can wall, wherein at least in one sub-region of the base, an external base covering is constructed in the form of a sheet material and is fixed- into position on an annular connection region of the can body, a decorative layer is constructed on the exterior of the can wall in the form of at least one paint layer and wherein the decorative layer extends at least to the outer edging of the base covering.

2. Can body according to claim 1, wherein the decorative layer is somewhat overlapped by the base covering.

3. Can body according to claim 1, wherein at least one layer of the can wall and the base is made of metal.

4. Can body according to claim 1, wherein the can wall and the base are at least one of made from a single piece and joined to one another via a seam.

5. Can body according to claim 1, wherein at least one of a sealed connection, a latching connection, and a welded connection is constructed between the base covering and the can body.

6. Can body according to claim 1, wherein the base covering is fixed into position on the base, on one end region of the can wall projecting over the base that is somewhat drawn in toward the axis of the can, wherein the transition from the can wall to the annular connection region is constructed in the form of a circular segment

7. Can body according to claim 1, wherein the base covering forms a standing region, and wherein a standing can body is only in contact with a support surface through the base covering.

8. Can body-according to claim 1, wherein the base covering is constructed basically flat in a main region that is surrounded by the annular connection region.

9. Can body according to claim 1, wherein the base covering includes tear apart device in the form of a first and a second covering subsurface, wherein the first covering subsurface is joined with the base via the seal connection and the second covering subsurface is fixed separably into position on the first covering subsurface.

10. Can body according to claim 1, wherein a hollow space, especially for accommodating an advertising article, is constructed between the base covering and the base.

11. Method for applying a base covering in connection with the base of a can body with a can wall that extends like a jacket around the axis of the can, and a base constructed on one end of the can wall, wherein at least one layer of the can wall and the base is made of metal and a decorative layer is constructed on the exterior of the can wall in the form of at least one paint layer, comprising:

fixing the base covering

the form of a sheet material into position on an annular connection region of the can body and wherein after said fixing, the decorative layer extends at least to the outer edging of the base covering.

12. Method according to claim 11, wherein, before the base covering is fixed into place, the can wall and the base are joined to one another via a seam, and the end region of the can wall that projects over the base is, if necessary, somewhat drawn in against the can axis.

13. Method according to claim 11, wherein, before the base covering is fixed into position, a decorative foil is arranged on the exterior of the can wall and an end region of the decorative foil is covered over by the base covering when the base covering is being fixed into position.

14. Device for applying an external base covering on a base of a can body that includes a closed can wall that extends like a jacket around an axis of the can, a base that is constructed on the one end of the can wall and a decorative layer constructed on the exterior of the can wall in the form of at least one paint layer, the device comprising:

a retaining apparatus for retaining the can wall, wherein the retaining device holds the base of a retained can body free, and a position fixing apparatus makes the base covering movable toward the base sand able to be fixed into position there, wherein after said fixing, the decorative layer extends at least to the outer edging of the base covering.

15. Device according to claim 14, wherein the position fixing apparatus comprises a feeding apparatus for feeding a base covering to the base of a can body held by the retaining apparatus, and includes at least one of a sealing apparatus, a pressing apparatus and, a welding device.

Device according to claim 14, wherein the retaining apparatus includes a centering apparatus for accommodating the base and a hold down apparatuses wherein the hold down apparatus, in interaction with the position fixing apparatus, makes a

16. desired contact force attainable between the base covering and the annular connection region of the can body.

17. Can body according to claim 1, wherein a decorative layer includes a decorative foil.

18. Can body according to claim 1, wherein the base covering is at least partially made of metal.

19. Can body according to claim 1, wherein the base covering is at least partially made of plastic.

20. Can body according to claim 1, wherein the base covering has a layer thickness of at least 0.02 mm.

21. Can body according to claim 1, wherein the base covering has a layer thickness in the region from 0.08 to 0.8 mm

22. Can body according to claim 1, wherein the base covering has a layer thickness in the region from 0.2 to 0.6 mm.

23. Can body according to claim 1, wherein the can wall and the base are joined to one another via a welded seam.

24. Can body according to claim 1, wherein the can wall and the base are joined to one another via a laser welded seam.

25. Can body according to claim 6, wherein the transition from the can wall to the annular connection region is constructed with a curvature radius in the range from 1 to 6 mm

26. Can body according to claim 25, wherein the curvature radius is basically 3 mm.

27. Can body according to claim 8, wherein the base covering includes an imprintable region.

28. Can body according to claim 1, wherein a hollow space, for accommodating an advertising article, is constructed between the base covering and the base.

29. Can body according to claim 1, wherein the base covering, with a surface adapted to the shape of the base, lies directly on the base.

30. Can body according to claim 29, wherein the base covering is sprayed directly onto the base as an injection molded component.

31. Method according to claim 12, wherein the can wall and the base are joined to one another via a welded seam.

32. Method according to claim 12, wherein the can wall and the base are joined to one another via a laser welded seam.

33. Device according to claim 15, wherein the retaining apparatus includes a centering apparatus for accommodating the base and a hold down apparatus, wherein the hold down apparatus, in interaction with the position fixing apparatus, makes a desired contact force attainable between the base covering and the annular connection region of the can body.

34. Can body according to claim 8, wherein the base covering includes an imprintable region including a bar code.

* * * * *

METHOD AND DEVICE FOR PRODUCING A CAN BODY AND CAN BODY

The invention relates to a method according to the introductory clause of claim 1, and to a device according to the introductory clause of claim 7 as well as to a can body according to the introductory clause of claim 13, and a method according to claim 16.

For simplifying the production of containers, particularly of aerosol cans comprising a decoration, some individual treatment steps of the current production methods can be simplified or, in some cases, omitted or replaced. For example, a method is known from WO 95/34474 wherein one can substantially do without imprinting and overpainting of the outer surface of a container. The decoration is imprinted onto a film, and the film is then applied to the outer surface of the container. By applying the decoration in the form of a film, various advantages are achieved. First, it is no longer required to run all operations necessary for the production of a container immediately one after the other. The printed film can be bought in completely imprinted form and does not need to be printed within the can production plant. One can economize in the cleaning procedure, because the application of a ready, sheet-like layer is less delicate than lacquering, particularly with respect to possible fatty residues. A further economization is obtained by omitting drying procedures. By omitting various parts of an installation, investment costs are also reduced.

Approaches where a label is wound around and fixed to a container have the disadvantage that arranging and fixing cannot be made very precisely. Such a label film does not adhere equally well in all places on the container so that the film can, in some cases be torn off. Residues of adhesive in the overlapping zone and insufficient engagement on the con-

tainer result in an unattractive appearance. According to other approaches, closed shrink films are shrunk on the containers. If a hose-shaped intermediate product or sleeve is produced from a printed shrink film, a film ribbon has to be wrapped around in such a manner that the two lateral margins meet each other in an overlapping manner. The overlapping lateral margins are interconnected by means of an applied adhesive. The closed ribbon is pressed flat, and is rolled up with two lateral folding lines. When producing a hose-like film ribbon, there will occur peripheral inaccuracies. In addition, the adhesive used results in optical deficiencies, and the two foldings, which result from pressing flat and rolling up, remain visible on the container. Since the shrinking capability of a film hose is increased in its longitudinal direction, a hose portion applied to a container would shrink more in the direction of the container's axis than in peripheral direction, which renders a precise engagement of the film hose more difficult. In order to be able to guarantee sufficient shrinking also in peripheral direction, a thick film had to be chosen, which involves higher costs and an undesirable high step in the overlapping zone.

Apart from various can shapes, various methods for producing can bodies are known. In the case of one-part aerosol cans of aluminum, the cylindrical can body is provided by cold sinking. Subsequently, a valve seat is formed at the open end by jolt-necking. U.S. Patent No. 4,095,544 and EP 0 666 124 A1 describe the production of weldless steel cans. In doing so, the cylindrical can body is produced by stamping, pressing and flow turning a steel sheet coated with tin or with plastic material. Very current are also cans from steel sheet material, where the shell comprises a longitudinal weld seam. The bottom and the upper closing are fastened to the shell by folded seam connections. From documents EP 200 098 A2 and EP 208 564, two part cans and multi-part cans are known, where the parts are interconnected by means of laser

welding. Due to the various shapes and the extremely thin can wall of the individual types of cans, it is not suitable to wind the decoration film directly onto the can body, and to connect it to form a closed film envelope on the can body. Connecting the film ends by means of an adhesive would be too expensive and would not satisfy both with respect to strength and esthetical aspects. To interconnect the film ends by a sealing connection, the sealed surface had to be pressed against the can body which is not suitable with thin cans due to the small strength. With cans, whose outer surface is narrowed at the lower end and particularly at the upper end or which deviate from a cylindrical shape, the sealing connection could not be attained over the whole height of the can.

From the documents US 4,199,851 and DE 197 16 079, solutions are known where a shrinkable flat plastic material is wound around a winding mandrel, is formed to closed envelopes, are slipped upwards in axial direction onto bottles as an all around label and are shrunk on. The all around labels have to have sufficient stability in order to be able to be moved by an annular part pushing the lower edge upwards up to a label region of the bottles. This is only possible if using plastic material of great thickness. From EP 397 558 A1, a solution is known, wherein all around labels are clamped by two partially annular pincers portions against an inner part, and are drawn downwards over a bottle. Since the all around label has to be drawn over the solid inner part and over the bottle due to the static friction at the pincers portions, this solution too can only be applied with extremely strong or thick all around labels, whose inner surface, in addition shows good sliding properties. In accordance with EP 547 754 A2, all around labels are tentered from the inner side and drawn over a bottle by holding rods oriented in parallel and moved in radial direction. Tentering by rods, which press to outside, is only possible with sufficiently robust, and thus thick, films. Thin films would

be deformed and/or damaged. In order to reduce friction on the bottle, air is blown out of the rods. When a desired position relative to the surface has been reached, pincers-shaped grippers, that are moved from outside, have to clamp the all around label so that the rods arranged in the interior can be pulled out without displacing the all around label. The transfer of all around labels onto bottles, known from the prior art, is expensive and not suited for thin films.

Since labels on bottles extend only over a middle zone, the bottles may be held without any problem in an upper or lower region, preferably at a thread at the opening, when applying all around labels. If a film is applied as a decorating layer onto a can, the film has substantially to cover the whole area of the external surface so that holding, as with bottles, is not possible.

In order to arrange a closed film envelope on a can body, the leading edge, according to EP 1 153 837 A1, is held on a winding mandrel. After winding up the film piece, the trailing edge of the piece of decorated film should overlap the leading edge. In the overlapping zone, a narrow sealing surface extending parallel to the longitudinal axis of the can is moved radially inwards and towards the winding mandrel. In order to enable a sealing connection in the overlapping zone, the film pieces have to be printed and cut in such a manner that a non-printed area exists at the leading edge, and in some cases at the trailing edge. In the non-printed area, the sealing layers formed on both sides of the plastic film should coincide and form a firm connection after sealing. Now, it has been found that with plastic films after printing, due to their elasticity, the presence in certainty of narrow, non-printed areas at the leading edge, and in some cases at the trailing edge cannot be guaranteed. The reason is that the films as long webs have to be unwound from coils when printing and cutting. The force necessary

for unwinding varies from the beginning of the coil to the end. Therefore, the elongating force acting on the film varies too, which leads to the above-mentioned inaccuracies. If the non-printed area were enlarged for compensating the inaccuracy, there would be an undesirable longitudinal strip without any decorating layer on the can body provided with the film.

When the sealing surface, which extends parallel to the longitudinal axis of the can, is moved radially inwards and towards the winding mandrel, it is difficult to ensure equal contact pressure along the whole sealing surface. Since the can body has to be associated to the winding mandrel at one front side for transferring a film envelope, the winding mandrel can only be supported at one front side. Due to the one-sided support, a small tilting excursion of the winding mandrel away from the sealing surface will result when pressing the sealing surface on. A small sliding movement caused by it between the winding mandrel and the sealing surface as well as the contact pressure that changes in direction of the axis of the winding mandrel can lead to a draft, in some cases to undulating in the overlapping and sealing area and to insufficient sealing. This may affect the esthetic effect of the decorated film even after transfer and shrinking on the can body. Moreover, it has been found that pressure lines or moulds of the lateral marginal lines of the sealing surface may occur in axial direction of the winding mandrel at both sides of the sealing surface, which are even visible on the can body.

With the thin decorated films mentioned in EP 1 153 837 A1 having a thickness of less than 25µm, preferably between 9µm and 21µm, great problems arise when sliding the closed film envelopes from the winding mandrel to the can body. The commercial plastic film Label-Lyte ROSO LR 400 of Mobil Oil Corporation able to be imprinted, as suggested, comprises a thin sealing layer on both sides and is available with

thicknesses of 20µm and 50µm. When sealing the overlapping area, the sealing layer engaging the winding mandrel is also heated and is pressed to the winding mandrel. In order to avoid that the cylindrical closed film on the winding mandrel is sealed to the winding mandrel, the sealing layer and the outer surface of the winding mandrel have to be provided in such a manner that they do not adhere to each other after a sealing procedure. Nevertheless, the adhering and sliding properties are somewhat different in the area of the sealing seam as compared with the other film areas. This may lead to problems when moving the film envelopes from the winding mandrel to the can body. If a partial area of the film envelope slides a little bit less well from the winding mandrel to the can body, it may jam on the winding mandrel or on the can body. Further problems may arise due to electrostatic charges and the electrostatic forces involved which act onto a film. Therefore, the transfer of a cylindrical closed film from a winding mandrel to a can body is problematic, even if the diameter of the winding mandrel is a little bit larger than the diameter of the can body. A significant difference in size is not desirable, because in this case the ability of the film to shrink has to be larger so that there is the risk of undulating when shrinking. For increasing the shrinking ability, a film of an elevated thickness has to be used, which is not desirable.

Therefore, the present invention has the object of finding an approach by which one can optimally imprint film envelopes of different films, particularly also of thin films, according to the needs, and to transfer them from a winding mandrel to a can body.

This problem is solved by the characteristics of claim 1 and of claim 7 and/or claim 13. The sub-claims describe preferred or alternative embodiments. The term "can body" should be understood to encompass all containers, particularly container-like intermediate products. When solving the

task, a method for imprinting film webs according to claim 16 has been invented which is novel and inventive for imprinting label webs irrespective of the production of cans.

When solving the problem, in a first inventive step it has been recognized that interconnecting the film piece to form a closed film envelope should not be made on the convex outer surface of a winding mandrel. A winding mandrel is adapted to convert the film piece into the shape of a cylindrical surface, the trailing edge of the decorated film piece, after winding the film piece up, overlapping the leading edge in an overlapping area. For achieving a perfect sealing connection and for simply transferring a closed film envelope to a can body, a concave inner surface, engaged by at least a portion of the film including the overlapping area, is better adapted. The contact force, necessary for achieving a sealing connection between a concave contact surface in the form of a partial surface of the concave inner surface and a convex contact surface in the form of a pressure ledge, may be absorbed by a support of an actuation device for the pressure ledge provided during pressing on the concave inner surface directly by an engaging part , for example a tubular part on the concave inner surface. The pressure ledge is, for example, arranged directly on the winding mandrel. The pressure force , due to the support, need not to be absorbed through a one-sided support of the winding mandrel, thus being substantially equal or constant over the entire height of the overlapping area. In addition, the concave inner surface may be pushed together with the film envelope over a can body without any jamming problem, and the can body can be introduced, after removing the winding mandrel or the convex pressing surface, into the concave inner surface and the film envelope held on it. In this position, the film envelope may be transferred by a shrinking procedure from the concave inner surface to the peripheral surface of the can body. Optionally, it is only a small annular area is shrunk to the can body so that it is guaran-

teed that the film envelope remains on the can body and the can body may be subjected to a shrinking procedure separated from the concave inner surface, which ensures a non-undulated engagement of the can body. This shrinking procedure can, for example, be effected in a furnace.

In a second inventive step it has been recognized that the pressure ledge, being displaced outward in radial direction, has not to supply any heat when performing the sealing connection at the concave inner surface, so as to be able to be designed for a non-adhering contact and an optimum pressure. Since the inner side of the film envelope, subsequently to forming the connection in the overlapping area, is sealed to the can body, it has to have a sealing layer on the inner side. Therefore, the pressure ledge moved to the exterior engages a sealing layer when forming the connection. The area of the sealing layer used for obtaining the connection is situated within the overlapping area on the inner side of the outer film layer or the trailing edge. In order to ensure that this area of the sealing layer is first subjected to a sealing procedure, heat should be supplied, for example from a good heat conductive partial surface of the concave inner surface. In correspondence, the pressure ledge moved to the exterior can be designed in such a way that it does not adhere to the sealing layer, and that it does not leave moulds by pressure. Thus, it may be broader than the overlapping area and/or resilient and/or may be formed of a material that is unable to form an adhering connection with the sealing layer.

The concave inner surface is, for example, formed by a circular cylindrical tubular part or a tubular holding element, and a cylindrical winding mandrel comprises in a first peripheral section a pressured ledge, and optionally in at least one second peripheral section, which is in particular offset by 180° relative to the first one, a propping ledge. After a film piece has been wound around the winding mandrel

and the winding mandrel is arranged within the tubular element, a transfer step is performed in which the film piece, preferably by a difference of pressure, is transferred from the convex outer surface of the winding mandrel to the concave inner surface of the holding element. To this end, air is directed, for example, from outlet openings on the outer surface of the winding mandrel towards the film piece and/or a negative pressure is produced through openings on the inner surface of the tubular piece. When transferring the film piece from the winding mandrel to the holding element, the film piece is displaced through a narrow annular space. In this way, the circumference is a little bit increased, and correspondingly is the overlapping area a little bit reduced. Due to the increase of circumference, when transferring, the trailing edge is moved relative to the leading edge in which way the wrinkle-free engagement of the two film ends in the overlapping area is still improved. When now the pressure ledge is moved to the overlapping area, a smooth engagement and a precise interconnection can be ensured. In order to supply the heat necessary for sealing substantially only the overlapping area, a heating ledge is formed, for example, on the holding element to which an insulated zone joins on each of its sides in peripheral direction. The temperature of the heating ledge is adapted to the sealing layer or its sealing temperature, to the heat conduction of the film and to the time provided for sealing.

Having established the sealing connection in the overlapping area, the winding mandrel and the holding element together with the closed film envelope are moved towards each other in axial direction. Subsequently, a relative motion is effected in axial direction between the can body and the holding element with the closed film envelope so that the film envelope is arranged around the can body. In order to bring the film envelope in a holding contact with the can body, at least in an annular area, a shrinking procedure is started at least in an annular area. To this end, hot air, for exam-

ple, particularly from one front side of the can body or of the holding element, may be introduced into the annular space between the can body and the holding element.

The hot air has to heat the annular area of the film envelope up to a temperature in which the shrinking procedure is effected. Since the shrinking temperature is higher than the sealing temperature, a firm sealing will, in some cases, directly be achieved when contacting the can body. If firm sealing should substantially be effected only after engagement of the film envelope on the can body, it is optionally suitable to supply heat, particularly hot air, from the holding element to the film envelope or an annular area of it.

If the film should extend in the bottom region of the can body somewhat beyond the bottom, it may extend after shrinking at least up to an outer annular region of the can bottom. In the case of can bodies having a base in this outer annular region, the base is occluded by the engaging film so that the base, even in the case of use of oxidizing can material, is protected against oxidizing. In order to ensure that the film remains always on the region of its lower edge on the can body, optionally an external base covering is arranged on the base in such a manner that it overlaps the edge of the film. Optionally, this base covering extends up to the peripheral surface of the can body, thus occluding the base so that it prevents occurrence of corrosion problems. The flat material is fixed to an annular connection area of the can body. If the connection is formed along a closed circular line, the membrane-like base covering will have a high stability.

A main area of the base covering, which is surrounded by an annular connection area, is for example substantially flat and comprises preferably a bar code imprinted. If the bar code can be applied to a substantially flat base surface, no

bar code is necessary on the can's wall, and any impairment of the design possibilities of the can's wall is prevented. Furthermore, no printing rollers for a bar code are necessary when printing a decoration of the can's wall. Thus, large quantities of can bodies having an attractive standard decoration on the can's wall can be produced. A changing information or an information which is not the same for all countries, such as a bar code or the filling date and/or an esthetically interfering information are printed to the base covering. These, optionally differing base coverings may be printed shortly prior to the filling moment of individual product batches and may be fixed to a standard can body. In this way, the same can may be used for all countries and all filling batches.

Since the base covering can be made flat in the area of a bar code, the bas code can be better read than a bar code applied to a curved can wall. If the coating of the outer surface of the can body in form of a decorated film extends up to the outer edge of the base covering, one may prevent that the metallic edge at the lower can end is visible.

The base covering is preferably made in form of a flat plastic material. It goes without saying that flat material having at least one metal layer, particularly an aluminum or steel layer, or even with a layer of cardboard, can also be used. The stability conferring layer may optionally be coated with plastic material. The flat material used should ensure a robust base covering which is not damaged in the conveyor devices of bottling installations and remains resistant even when standing on a wet base. The flat materials mentioned above may all be provided with a sealing layer to be firmly sealed at the bottom. Instead of a sealing connection, optionally a catch connection or a welding connection, particularly comprising at least three laser welding points, may be provided. If a magnetizable base covering is used, it

may enable conveying by means of magnet conveyors, even with can bodies of non-magnetizable material.

Since the movements between the winding mandrel and the holding element involve a large stroke when bringing them together in axial direction, the holding element may optionally be formed at least of a partial tube or a half-tube so that bringing together can also be effected by a movement transversely to the axial direction of those parts. To ensure, nevertheless, a substantially complete surrounding of the winding mandrel, the holding element comprises, for example, at least two segments of a tube which can spread out in opposite directions or are pivotally interconnected. After moving the winding mandrel and one segment together, the at least one further segment may be furnished or pivoted to them. For separating the winding mandrel from at least two segments of the holding element, by which the now closed film envelope is held, a movement has to be executed in axial direction.

The method described above can particularly advantageously be used when utilizing a film that is imprinted, in some cases, on its outer side or front side, but preferably on the side facing the can body or the back side. With a transparent film printed on the back side, the printed layer is protected by the film so that no impairment of the decoration caused by friction can occur. A transparent film printed on the back side may be provided after printing with a sealing layer which ensures a firm sealing connection between the film and the can body as well as between the film margins in the overlapping area even through the printed layer. One can do without a non-printed area and precise cutting that involves some problems. Since printing can be effected up to the cutting line or universally, no non-printed peripheral areas will be present on the can body.

In some cases it is advantageous, if the printed layer on the film's back side takes substantially over the function of a primary coat, and the remaining decoration is printed onto the front side of the film. If now, the term primary coat is used, this may either be a uniform flat color or even part of the decoration, for example a two-dimensional color or image design. The film web preprinted on its back side in a first printing plant will be imprinted on its front side in a further printing step. This further printing step can, optionally, be effected at the can producers or in another printing plant in order to apply specific decoration information. This means, for example, that in addition to a basic decoration, an inscription is applied in a further printing step which may be different for the respective sales area. For printing the front side , any printing method known in the art may be used, optionally together with some surface treatment carried out after printing.

Advantageously, a printing step of transfer process may be used for printing film webs. when doing this, at least one, but preferably different colors, reach a transfer surface, and from the transfer surface they reach in one step the film. This transfer process can be used for the front or the back side of the film or for both sides, and can be used independent from the use of a film described in the context of the present invention, particularly for labels too in a novel and inventive and advantageous manner. A similar printing process is known from U.S. Patent No. 4,245 583 for printing collapsible tubes, cans or bowls. For printing webs, only methods have been used up to now, wherein the different colors have been applied one after the other, and have been dried between the application stations. Due to the large length of webs, those skilled in the art had the opinion, printing and drying in subsequent stations is always suitable. Articles, in contrast, are considered differently, because due to their short peripheral length no more than one printing station can be arranged at their periphery. Be-

tween two printing operations, the articles have to be passed through a drying device. Regarding printing webs, a prejudice had to be overcome by the present invention.

According to the prior art, thin films are moved through a plurality of printing zones, each having a printing group and a drying device, which involves great expenses as to devices and energy. In addition, the partial prints of the individual printing groups have precisely to coincide which involves great problems due to the elasticity of thin films. Up to the moment when the partial prints of the different printing groups do coincide exactly, there is a great loss of material. Moreover, a minimum change of the elongation of film may displace the superimposition during printing operation. Therefore, one has to provide an expensive monitoring facility and a correction control.

If now the different partial prints are applied wet on wet onto a transfer surface, for example a rubber blanket or a transfer cylinder, the whole printed image can be transferred to the film in one step and, thus, without any coincidence problem. It is merely a transfer group and a drying device which is needed. Particularly advantageous is this front sided transfer print with a transparent film which shows a primary print on the backside. Due to the primary print, it is only a small area of the transfer surface which has to be provided with different colors, which prevents undesirable effects of the wet on wet application of color onto the transfer surface. In the case of a film web, a qualitative high ranking decorated film for labels and/or an outer layer of a can be provided at small expenses and without any transfer problem, for example by printing the backside in at least one rotogravure step and the front side in a flexo printing step. Since the two printing steps can be effected separately, there is a great range with respect to different small quantities. This is advantageous also for labels, because in this way one may supply to the various

filling firms of a product or to the consumers of a label a film coil showing a primary decoration on the backside of the film, and the filling firm or consumer may apply different prints on the front side of the film prior to using the labels.

Further decorative effects can be obtained with the shrinkable closed film envelopes according to the invention. For example, at least one structure element may be arranged on the outer surface of the can body prior to shrinking firmly the film on. The structure element is held by the film envelope, and the surface structure of the structure element may be recognized or is perceptible through the film. For example a nap ring may be fixed to the can body prior to application of the decorated film. In the case of can bodies produced from flat material, particularly metal sheet, the structure may be stamped directly into the flat material so that one can do without arranging a structure element. The decorated film may be left transparent in a partial area so that the structure element or, optionally, the surface of the can body remains visible. If a structure element does not extend around the can body, the structure element may be arranged on the winding mandrel prior to winding up the film piece. Having wound up the film piece, the structure element is on the backside of the film, can be held on the film piece with a small adherence force, may be moved to the concave inner surface and, after introduction of the can body, towards the latter together with the shrinking film.

Transfer of the wound up film piece from the winding mandrel to a concave inner surface and subsequent formation of a sealing connection may also be used for providing an inner layer of the can in the form of a film. To this end, a winding mandrel, after winding up a film piece, is moved into the interior of a can body. By supplying pressurized air between the winding mandrel and the film piece and/or by moving at least an area of the circumferential surface of the

winding mandrel outwards in radial direction, the film piece may be brought towards the concave inner surface of the can body at least in some areas. In some cases, a negative pressure is created radially outside the film piece from one front side between the inner wall of the can and the film piece so that the film piece engages the inner wall of the can body due to the negative pressure or due to the pressure difference between the partial spaces at both sides of the film piece. The length of the film piece is chosen in such a manner that the film piece engaging the can wall has an overlapping area. If now heat is supplied, in some cases, to the film through the wall of the can body, and the film comprises a sealing layer at the side facing the exterior, a sealing connection to the can wall may be obtained, for example, at least in the overlapping area, and preferably also a sealing connection between both film layers. In order to seal the film firmly in a manner as extensive as possible to the wall of the can body, the film is pressed to the wall by means of an overpressure and/or by at least one pressing surface, and heat is supplied substantially through the entire peripheral wall or, optionally, also from the interior of the can. Preferably, the convex pressing surface of a pressing ledge presses from the winding mandrel against the overlapping area. Since the development of plies is not disturbing in the can's interior, even a one-sidedly supported sealing ledge could be pressed against the overlapping area. In order to obtain an occlusion formed by the film even towards the can's bottom, the wound film piece is made protruding, for example, beyond the end face, and is closed prior to insertion into the can body by shrinking or turning, this closure being not able to engage closely the can's base due to undulations. However, optionally a further film piece is introduced into the can body at one front side of the winding mandrel and is fixed to the can's bottom, the film piece assigned to the wall and that assigned to the base being preferably tightly interconnected. This can be obtained, for example, by means of a sealing element to be

pressed against the annular contact area between the two film pieces.

By transferring a closed film envelope, according to the invention, to the can body without any problem, it is possible to assign the function of a stable structure to the can body and the function of a decoration or of an inner barrier to the film envelope in such a manner that both functions may be optimized substantially independently from one another.

The winding mandrel may be designed in such a way that the film adheres to the winding mandrel at least in the region of the leading portion of the film, and the film is able to be wound precisely around the mandrel. For attaining such an adherence, the interior of the winding mandrel communicates preferably with a negative pressure device, fine holes leading through the peripheral wall of the winding mandrel so that the film is held in the region of the holes by negative pressure. It goes without saying that the film may also be held to the winding mandrel by means of electrostatic adherence forces or, optionally, by mechanical means.

The treating station for applying the decorated film is preferably equipped with a turntable. A winding mandrel and at least one holding element having a concave inner surface is associated to each can place. A film piece is cut from a film web and is wound to a winding mandrel, the leading edge and the trailing edge of the film piece being held somewhat in an overlapping fashion on the winding mandrel. After transfer to a concave inner surface, the film piece may be sealed in the overlapping area and may be firmly shrunk to the can body. Since shrinking and sealing is obtained by the influence of heat, it is suitable if the temperature necessary for sealing is a little bit below the minimum temperature for shrinking. Having applied a sealing layer, the sealing procedure may be effected at a temperature of about 130°C. Shrinking of the film ROSO LR 400 known in the prior

art begins, however, only at a temperature of at least 140°C.

In order to prevent that the film displaces on the can body, at least one shrinking unit is provided at the treating station for applying the decorated film, which heats the film in such a manner that at least an annular partial area of it engages the can body so closely that the can may be moved to further treatment stations without any displacement of the film relative to the can body. In a further treating station, preferably comprising a turntable, the film is substantially completely shrunk to the can body. To this end, the film is heated by heat radiation and/or by contact heat, particularly with hot air, so that is subjected to the desired shrinking procedure.

The film ROSO LR 400 of a thickness of 20 µm can, for example, be shortened by shrinking at least by 18% in longitudinal direction. Now it has been shown that the film may also be shrunk onto a, already narrowed neck portion. If, however, narrowing is too extensive to engage the film onto the neck by shrinking, it may be more suitable in some cases, to carry out the entire narrowing, but preferably at least part of the narrowing, only after having shrunk the closed film on. To ensure for a narrowing step that the film is firmly connected to the peripheral wall of the can, a sealing procedure has to be carried out after the shrinking procedure, wherein the film is firmly connected to the can body at least in the region to be narrowed.

In the case of a beverage can, the adherence of the film on the can body after a shrinking procedure may already be sufficient, the film being then able to be removed from the can after cutting it open. In the case of aerosol cans, the requirements to the adherence of the film are greater. Even after a damage or after cutting open, the film has to remain on the can body. To this end, preferably a sealing procedure

is carried out after shrinking, wherein at least a partial area of the film, but preferably in the whole peripheral area, is firmly connected to the can body. The sealing layer necessary for sealing it on is arranged on the side of the film which faces the can body. Heat required for sealing reaches the sealing layer preferably through the film. Optionally, heat is transferred in an inductive way to the can body. However, pressing surfaces may also be used for transferring both heat and pressure force.

If a sealing layer is used which cannot be firmly sealed to a metal surface, it is suitable if the can body is formed by sheet metal coated with plastic material. It has been shown that a coating of plastic material on a can body of coated sheet metal is able to be extremely well connected to a sealing layer of a film.

If deforming an open can end is necessary, at least one further treatment station is provided which preferably comprises a turntable to which necking devices, particularly spin-flow-necking devices, are associated. In this way treatment can be carried out during revolution of the turntable. Since, in case of spin-flow-necking devices, the treating tool and the can body are rotated relative to each other about the can axis, either the can body or the treating tool has to be able to be rotated about the can axis relative to the turntable. In order to enable beading of the free front side of a narrowed neck portion, preferably an edge beading device is provided. The latter is assigned about to the can places of a turntable of the treatment station for deforming the open can end. It goes without saying that instead of a (de)formation to a valve seat of an aerosol can, a can occlusion for beading or welding on a dome including a valve seat, or a beverage can cover may be formed. In order to cover the upper edge of a decorated film and/or some connected to the can occlusion, an upper annular covering element may be provided. This upper covering ele-

ment, in the case of aerosol cans, is optionally formed by a partial region of the valve or by a part fastened to the valve seat. It will be understood that it may also be fixed to the upper can end, in an analogous way as with the base covering, by a sealing connection, a catch connection or a welding connection, particularly including at least three laser welding points, this part overlapping the upper film end, thus protecting it against tearing off.

The drawings explain the approach according to the invention with reference to an embodiment, wherein

Fig. 1 is a schematic illustration of a device which transfers a piece of film from a winding mandrel to a can body by means of a holding device,

Fig. 2 shows a horizontal cross-section of the winding mandrel and a holding device,

Fig. 3 is a perspective view of a detail of the winding mandrel together with a pressing surface,

Fig. 4 is a cross-section of a detail of the wall of a can body comprising an engaging decorated film,

Fig. 5 is a perspective view of a severing device for severing a broad film web into a plurality of partial webs,

Fig. 6 is a vertical cross-section of an installation which arranges a separating film in the interior of a can body, and

Fig. 7 is a schematic illustration of a printing device for imprinting a film web.

FIG. 1 shows a device 1 for applying a decorated film 3 on a can body 2. A supply device 4 supports a film coil 3a and feeds the free end of the film web 3b wound on the film coil to a cutting device 5 which severs film pieces 3c from the film web 3b. According to situation a, the film pieces 3c are fed to a winding mandrel 7 which is, for example, ensured either by the cutting device 5 or by a carry on device 6. The leading edge of a film piece 3c is positioned on the

winding mandrel 7 and is wound onto the winding mandrel 7 by rotating the winding mandrel 7 about its longitudinal axis so that an overlapping area is formed between the leading edge and the trailing edge of the film piece, wherein two film layers engage the winding mandrel. In order that the film piece 3c is held on the winding mandrel 7, the winding mandrel 7 comprises preferably a hollow space 8 to which a negative pressure and, optionally even a positive pressure relative to the environmental pressure may be applied, and communication channels 8a which communicate the hollow space 8 to the outer surface of the winding mandrel 7. The negative pressure may form through the communication channels 8a between the winding mandrel 7 and the film piece 3c and may ensure the desired adherence. It will be understood that the film may also be held on the winding mandrel due to an electrostatic adherence force or, optionally, also mechanically.

In the embodiment shown, the winding mandrel 7 is arranged on a first installation part 10 by means of a rotatable holding tube 9. In the interior of the holding tube 9 is a communication conduit 8b formed from the hollow space 8 to a device for generating a negative and/or positive pressure. In order to be able to transfer the winding mandrel 7 together with a film piece wound on it to a concave inner surface 11a of a holding device 11, the holding tube 9 is displaceable along its longitudinal axis. A holding device 11 including a concave inner surface 11a) is associated to the winding mandrel 7 in such a manner that the winding mandrel 7 may be introduced into the concave inner surface by a movement along its axis (situation b) and may be drawn out again. It will be understood that only the concave inner surface 11a may be displaceable along this axis. After winding the film piece onto the winding mandrel 7, the concave inner surface 11a would then be pushed over the winding mandrel.

Now, the overlapping area of the interengaging film areas of the leading edge and the trailing edge are sealed to each other on the concave inner surface 11a. To this end, a convex pressure surface is pressed to the outside and against the concave inner surface so that a sealing pressure and a sealing temperature are obtained in the overlapping area. The heat necessary for sealing the overlapping area is preferably supplied from the concave inner surface, particularly from a partial area of the concave inner surface. In the embodiment shown, the winding mandrel comprises guiding portions 7a on both front sides, of which at least the upper one is conuncted to the holding tube 9. At least two mandrel segments 7b are held on the guiding portions 7a, one of these mandrel segments comprising the convex pressure surface and is movable in radial direction to the outside and may be reset again. Optionally, all mandrel segments 7b may be moved in radial direction and are, to this end, guided by the guiding portions 7a. In order to be able to press at least one of the mandrel segments to the outside, for example an actuation cone 7c is arranged in the interior of the mandrel segments 7b, the actuation cone 7c and the mandrel segments 7b to be actuated comprising each inclined surfaces, particularly partial cone surfaces, which face each other. If now the actuation cone 7c is drawn upwards by an actuation element 12, preferably a tube including the communication conduit 8b, the cooperation of the inclined surfaces results in a motion of the moveable mandrel segments 7b in radial direction to the outside. Reset of the guiding portions 7a ensures during a downward movement of the actuation cone 7c a radial inward movement of the mandrel segments.

Fig.2 shows an embodiment wherein seven mandrel segments 7b may be moved in radial direction. Having inserted the winding mandrel 7 together with the film piece 3c into the holding device 11, the mandrel segments 7b may be moved to the outside against the concave inner surface 11a. Due to the

increase in circumference, the distance between the leading and the trailing edge of the film piece 3c, i.e. the overlapping area, will become somewhat smaller, the small displacement leading to a precise engagement in the overlapping area. The convex pressure surface 13 is formed on one of the mandrel segments 7b. The film piece 3c is positioned in such a manner that the overlapping area 14 is assigned to the pressure surface 13. the pressing force of the pressure surface, that acts onto the overlapping area 14 is transferred to the concave inner surface 11a by a support via at least one mandrel segment 7b. The convex pressure surface is preferably broader than the overlapping area and/or resilient and/or consists of a material which is unable to get into an adhering connection with the sealing layer. In this way, one can prevent pressed moulds in the film piece 3c. The heat necessary for sealing the overlapping area 14 is supplied by sealing surface 15a to be heated to the concave inner surface 11a. The sealing surface 15a is the inner surface of a sealing element 15, to which, optionally, an insulation zone 16 joins each on both sides in peripheral direction.

After sealing the overlapping area 14, the film piece 3c may be designated a closed film piece 3d. The closed film piece 3d is now transferred from the winding mandrel 7 to the holding device 11. To this end, the holding force of the winding mandrel has to be removed which, in the embodiment shown, is effected by degrading the negative pressure in the hollow space 8. The communication channels 8a leading to the outer surface of the winding mandrel 7 are formed, according to Fig. 2, by the interspaces between the mandrel segments 7b. According to Fig. 1, however, bores can also be provided. For holding the closed film piece 3d on the holding device 11, the latter comprises, for example, air channels 11b including apertures at the concave inner surface 11a. The closed film piece 3d is held to the concave inner surface by negative pressure in the air channels 11b. When the actuation element 12 is moved downwards, this results in a

motion of the mandrel segments 7b inwards in radial direction by the reset device of the guiding portions 7a.

In accordance with Fig. 1, situation c, the winding mandrel 7 is moved out of the holding device 11 into the upper position, and the holding device 11 together with the closed film piece 3d is moved over the can body. By supplying heat, for example through hot air nozzles 17, the shrinking temperature may be exceeded at the lower edge of the closed film piece 3d so that at least the lower terminal area of the film piece 3d engages the can body 2. After degrading the negative pressure in the air channels 11b, the holding device 11 is moved away from the can body 2 and upwards (situation d). Since the film piece 3d adheres now to the can body 2 in the desired position, the can body 2 together with the film piece 3d may be conveyed to a further treatment station, for example to a furnace, where the shrinking procedure is completed and, in some cases, firmly sealing the decorated film to the can body is effected. The further treatment station for carrying out the shrinking procedure supplies heat to the transferred film piece, the heat being preferably supplied in the form of radiant heat and/or contact heat, particularly by means of hot air, but optionally even inductively through the can body.

For carrying out the fastening procedure by which the decorated film is firmly sealed on the can body, at least in a partial area, a connecting device is optionally provided. Such a connecting device transfers heat to the film piece engaging the can body so that its sealing layer forms a sealing connection to the can body. In some cases, the decorated film is pressed against the can body by a pressing surface, this pressing surface being optionally moved over the can body for flattening possible plies. Heat is preferably supplied inductively through the can body, but in some cases by radiant heat and/or contact heat. Optionally the same device is used for shrinking and sealing, wherein only

different treatment temperatures are provided for the two procedures.

The device for applying a decorated film is preferably built up as a turning station. In this case, a winding mandrel 7 and a holding device 11 are respectively associated to each can place, wherein these parts are preferably arranged above the cans to be treated. The turning station comprises, for example, an upper turning part 18b which holds the winding mandrels 7, and a lower turning part 18a including can places 19, the hot air nozzles 17 and the holding devices 11. The can bodies are placed onto the can places by the transfer stations, and are removed again at the end.

Fig. 3 shows a winding mandrel 7 which comprises pressing element 19 including the pressing surface 13 only instead of the mandrel segments 7b. In the embodiment shown, the pressing element 19 is moved and actuated by a guiding and stop device 21 and an actuation channel 20 by means of pressurized air. A first position of the pressing element 19 drawn to the interior is achieved by means of a negative pressure in the actuation channel 20. A second position of the pressing element 19 pressed to the exterior is achieved by means of a positive pressure in the actuation channel 20. Since the film piece, in the first position of the pressing element 16, has to be held engaged on the winding mandrel 7, a negative pressure, and, thus, some adherence between the film piece and the pressing surface 13 can be achieved by connection bores 19a. The leading edge of the film piece may be oriented, for example, on a stop edge 7d of the winding mandrel 7 so that the overlapping area is situated in the region of the pressing surface 13. In the second position of the pressing element 19, the film piece is pressed against the concave inner surface and needs no longer to be held on the winding mandrel 7. Release of the film is achieved by air which emanates through the connection bores 19a due to an overpressure in the actuation channel 20.

Fig. 4 shows a detail of a can body 2 engaged by an overlapping area 14. The closed film piece 3d comprises a transparent film 3e having a printed coating 3f and a sealing layer located on the printed layer. The printed coating comprises preferably at least one first printed layer in the form of a counter-print, and optionally a primary coat or body color at the side averted from the film, directly at the sealing layer. Preferably three, but in particular four printed layers of different colors are provided. When using a counter-print, the printed layer is protected by the film. It will be understood that films may be used which are printed with a standard print on the side facing the exterior, wherein then, in some cases, first a body color is applied, and after the desired printed layers, preferably a protective lacquer layer. The sealing layer is then applied on the side of the film which is averted from the printed layer. After winding up the film pieces, the sealing layer engages respectively the can body 2. In the overlapping area 14, the sealing layer of the outer film end engages the inner film end. Therefore, it is suitable when forming the connection in the overlapping area 14, if heat is supplied from the concave inner surface 11a. The heat reaches then first the sealing layer 3g, which achieves the connection. The sealing layer 3g which engages the pressing surface 13 is less heated.

When using film webs which are printed at the backside with at least one body color or primary coat (counter-print), there is the possibility of applying at least one further print layer on the outer side and in some cases to apply a print layer including more than one color. The externally applied print layer 3h may be applied using any known printing method, for example my means of flexographic printing, serigraphy, rotogravure, hotstamping or digital printing. If a transfer printing process is used, a method may be employed where the desired colors are transferred to a trans-

fer surface wet on wet one over the other. From the transfer surface, the whole print is transferred in one step onto the film. In this way, one may do without drying several times after partial prints subsequently applied.

Fig. 5 shows a broad film coil 3a', which is divided into several film webs 3b by means of a cutting device 22, the film webs 3b being wound onto film coils 3a. The broad film coil 3a' has a width b1 that corresponds to a plurality of can heights. The film webs 3a have each a width b2 which corresponds to the can height. If now the broad film coil 3a' is printed by counter-printing with a standard decoration, the small film coils 3a may be imprinted on the external side each with the locally necessary information for different countries. This specific print, according to the needs, may be carried out at different places, preferably near the respective can producers.

Fig. 6 shows an approach for transferring the wound film piece from the winding mandrel to a concave inner surface and the subsequent formation of a sealing connection, the concave inner surface being formed by the inner wall of a can body, and the film piece is used for providing an inner layer of the can. To this end, a film piece 3c is wound onto the winding mandrel 7. In order to obtain also a cover formed by the film towards the can bottom, the wound film piece 3c, for example, is allowed to project below beyond the front side, and is closed by means of a closing device by shrinking or twisting. The overlapping area 14 should, however, further remain displaceable in the region of the winding mandrel 7. Subsequently, the winding mandrel 7 together with a film piece 3c, that is closed at the bottom, is introduced into a can body 2, the lower cover being not able to engage closely the can bottom because of undulations.

By moving mandrel segments 7b, as already has been described with reference to Figs. 1 and 2, to the exterior in radial direction and/or by supplying pressurized air between the winding mandrel 7 and the film piece 3c, at least some areas of the film piece 3c may brought towards the concave inner surface 11a of the can body 2. The length of the film piece 3c in peripheral direction is chosen in such a way that the film piece 3c that engages the can wall comprises still an overlapping area 14. If now heat is supplied to the film, optionally through the wall of the can body, and the film comprises a sealing layer, a sealing connection can be obtained between the film layers, for example, at least in the overlapping area. Preferably, the convex pressing surface 13 of the winding mandrel 7 presses, as illustrated in Fig. 2, against the overlapping area 14. Instead of the holding device illustrated in Fig. 2, the can body is used. In order to seal the film firmly to a most possible extent to the wall of the can body, the film is pressed by means of a positive pressure and/or by means of a plurality of mandrel segments 7b against the inner wall of the can, and heat is supplied substantially over the whole peripheral wall or, optionally, also from the interior of the can.

Fig. 7 shows an approach in which a printing step is carried out using a transfer method. Performing this, at least one, but preferably various colors from wetting receptacles 24 reach by means of gridded rollers 25 printing type forms 26 or drums, and from there transfer surfaces 27 or rubber blankets. From the transfer surfaces, the wet on wet applied colors reach the film web 3b in a single step. The transfer surfaces 27 are situated on the peripheral surface of the support drum 28, and the film web 3b is brought into contact with the transfer surfaces 27 by a pressure drum 29.

If now the partial prints are applied wet on wet onto a transfer surface, for example a rubber blanket or a transfer cylinder, the whole print image can be transferred to the

film in a single step and without any coincidence problem. It is only a transfer group and one drying device 30 which are needed. The drying device 30 may optionally also comprise an applying device for a protective lacquer. The film web 3b is unwound from a first coil 31 to a second coil 32. In some cases, a pretreatment device 33 may be provided in which, for example, the backside of the film is provided with a primary coat and/or a sealing layer.

Fig. 8 shows the can body 2 of an aerosol can, the can body 2 being composed of a peripheral portion 2a and a bottom portion 2b. It will be understood that the can body may equally be formed integral. The view to the connection between the bottom portion 2b and the peripheral portion 2a is masked by a base covering 2c. At the upper end of the can body 2, a valve seat 2d is formed by a jolted contraction and by forming at the opening. The peripheral portion 2a is provided with a decorated film 3 in accordance with the process described above. The decorated film 3 is, for example, shrunk after narrowing the upper can end and extends, in particular, substantially up to the end edge of the peripheral portion 2a so that the film end, after forming the opening, is clamped firmly in the formed can edge.

If the decorated film 3 does not extend up to the upper can edge, an upper cover part 2e may be arranged on the upper can portion which covers the upper end area of the decorated film 3.If the can body 2 is formed of three parts, an upper obturation part including the valve seat has to be fixed to the peripheral portion 2a. According to the prior art, this is done using a folding seam or, in some cases, by welding (EP 208 564 B1). The unattractive seam region, thus created, between the upper obturation part and the peripheral portion 2a may be covered by the upper cover part 2e. In the case of an aerosol can, the upper cover part 2e is a part connected to the valve which, after inserting the valve is always on the can. By providing cover parts 2c, 2e, three-partite cans

may be provided where the consumer cannot recognize that the can body 2 is composed of different parts. In principle, all known connection types may be used for tightly connecting can parts.

In the embodiment of Fig. 8, the bottom portion 2b is connected to the peripheral portion 2a by an annular welding connection. At the bottom, an edge region of the bottom portion 2b extends towards the peripheral portion 2a, engaging the lower edge of the peripheral portion 2a. The welding connection may be groove-shaped or may be in the contact area of these two portions. It will be understood that the portions may also be welded together in a butted way, that at least one of the connections may be formed as a saddle joint, or that a connection is provided only below or only above. Without using an upper obturation part, the peripheral portion 2a has to be narrowed very considerably for forming a valve seat which, with various materials, involves high expenses, particularly including many individual jolting steps, and in some cases insurmountable problems. Due to the possibility of an obturation, an optimized composition of the can body may be chosen without showing a negative appearance.

The base covering 2c, and optionally also the upper cover part 2e, may be used for protecting and firmly clamping the lower or the upper film edge of the decorated film 3. In this way, the risk of a decorated film 3 becoming detached is substantially reduced. Welding seams in longitudinal direction of a can may also be covered by a decorated film 3. A peripheral portion of a can, which is formed by bending and welding together, particularly by laser welding, may obtain a special shape already by the cut to size of the composed parts. Since the material of the metal flat material formed to constitute the periphery is not hardened by forming steps, the periphery may be shaped, at least in some regions, by changing the circumference. In this way, estheti-

cally attractive cans may be shaped which may be provided with a shrinking decorated film 3 either prior to or after the forming step. If structural elements are arranged between the peripheral portion 2a and the decorated film 3, cans having special effects can be provided. Thus, a variety of new design possibilities will result.

C l a i m s :

1. Method for producing a can body (2), in which method a film piece (3c) is cut from a film web (3b), and the film piece (3c) is wound on a winding mandrel (7) from its leading edge to its trailing edge and is held in a somewhat overlapping manner on the winding mandrel (7), **characterized in that** the film piece (3c) is transferred from the winding mandrel (7) to a concave inner surface (11a), and the overlapping area (14) of the interengaging film areas of the leading edge and the trailing edge are sealed with one another on the concave inner surface (11a).

2. Method according to claim 1, **characterized in that** the concave inner surface (11a) is formed on holding means (11), and that the cylindrical closed film piece (3d), subsequent to the sealing of the overlapping area (14), is brought from the concave inner surface (11a) onto a can body (2) and is engaged at least in part by at least one shrinking procedure.

3. Method according to claim 1 or 2, **characterized in that** for sealing the interengaging film areas in the overlapping area (14), a convex pressing surface (13) is pressed to the exterior against the concave inner surface (11a), while achieving a sealing pressure and a sealing temperature in the overlapping area (14), the heat needed to seal the overlapping area (14) being preferably supplied from the concave inner surface (11a), particularly from a partial surface (15a) of the concave inner surface (11a).

4. Method according to claim 3, **characterized in that** the convex pressing surface (13) is actuated by actuation means, a support being achieved during pressing at the concave inner surface (11a) and/or the the convex pressing surface (13) is broader than the overlapping area

(14) and/or is resilient and/or is of a material that is unable to form an adhering connection with the sealing layer.

5. Method according to any of claims 2 to 4, **characterized in that** after forming the sealing connection in the overlapping area (14), the winding mandrel (7) and the holding element (11) together with the closed film envelope (3d) and subsequently the can body (2) and the holding element (11) together with the closed film envelope (3d) are moved in axial direction relative to each other so that the film envelope (3d) is arranged around the can body (2) and is brought into contact with the can body (2) by a first shrinking procedure at least in an annular area, and is, optionally, completely shrunk to the can body (2) in a second shrinking procedure, preferably outside the holding element (11), the heat for at least one shrinking procedure being preferably supplied in the form of radiant heat and/or contact heat, particularly by means of hot air, but optionally inductively through the can body (2).

6. Method according to any of claims 1 to 5, **characterized in that** for carrying out the connection procedure, heat, and optionally a pressure force, is applied at least to a partial area of the film piece (3d) transferred to the can body (2), so that a sealing connection between at least a partial area of the film piece (3d) and the can body (2) is achieved, the heat being preferably supplied inductively through the can body (2), but optionally in the form of radiant heat and/or contact heat.

7. Device for applying a film piece (3c) to a can body (2) comprising at least one receiver for holding a can body (19), feeding means for feeding film pieces (3c), at least one winding mandrel (7) onto which film pieces (3c) may be wound adhering thereto in such a way that their

respective leading edge and their respective trailing edge are held on the winding mandrel in somewhat overlapping relationship, and further comprising at least one sealing means (15) to be heated, **characterized in that** holding means (11) including a concave inner surface (11a) are formed and are moveable relative to the winding mandrel (7) in such a manner that at least a partial area of the film piece (3c) including the leading edge and the trailing edge of the film piece (3c) are transferable from the winding mandrel (7) to the concave inner surface (11a), a pressure surface (13) renders the interengaging film pieces of an overlapping area (14) between the leading edge and the trailing edge able to be pressed to the concave inner surface (11a), the sealing means (15) renders a sealing procedure for connecting the overlapping area (15) releasable, and the concave inner surface (11a) is moveable relative to the can body (2) so that the cylindrical closed film piece (3d) may be supplied to the can body (2) and is engageable at least in part to the can body (2) by shrinking means.

8. Device according to claim 7, **characterized in that** the convex pressure surface (13) is moveable by actuation means (7c), preferably located on the winding mandrel (7) and particularly renders a pressure force obtainable, which may prop against the concave inner surface (11a), the convex pressure surface (13) being, in particular, broader then the overlapping area (14) and/or resilient and/or is of a material that is unable to form an adhering connection with the sealing layer.

9. Device according to claim 7 or 8, **characterized in that** the sealing means (15) comprises a sealing surface (15a) to be heated, which faces the convex pressure surface at the concave inner surface (11a), to which an insulation zone (16) joins, optionally on both sides, in peripheral direction.

10. Device according to any of claims 7 to 9, **characterized in that** the device comprises at least one turning station (18a, 18b), which includes receiver means (19) for holding can bodies (2) on a circular line at equal distances, a winding mandrel (7) and holding means (11) including a concave inner surface (11a) being associated to each receiver means (19).

11. Device according to any of claims 7 to 10, **characterized in that** the at least one shrinking means for carrying out said shrinking procedure renders heat able to be supplied to at least a partial area of the film piece (3d) transferred to the can body (2), the heat being preferably supplied in the form of radiant heat and/or contact heat, but optionally inductively through the can body (2).

12. Device according to any of claims 7 to 11, **characterized in that** connection means for carrying out said connection procedure renders heat able to be supplied to at least a partial area of the film piece (3d) transferred to the can body (2), and optionally also a pressure force, so that a sealing connection is achieved between at least a partial area of the film piece (3d and the can body (2), the heat being preferably supplied inductively through the can body (2), but optionally in the form of radiant heat and/or contact heat.

13. Can body (2) comprising a film piece (3d), said film piece (3d) extending around the periphery of the can, including at least one sealing layer (3g) wherein the interengaging film areas being sealed to each other in an overlapping area (14), and the film piece being formed as a shrinking film, while having different abilities to shrink in the two main directions, **characterized in that** the film piece (3d) engages everywhere the can body (2)

directly, and thus free of adhesive, and that the direction of greater ability to shrink extends in peripheral direction of the can body (2).

14. Can body according to claim 13, **characterized in that** the film piece (3d) is printed on its backside and comprises a sealing layer (3g) on the printed layer (3f) and/or has a thickness of less than 25 µm, preferably between 9 µm and 21 µm.

15. Can body according to claim 13 or 14, **characterized in that** the film piece (3d) extends in the bottom region of the can body (2) up to an outer annular area of the can base and/or that an external base covering is arranged on the base in such a manner that it overlaps the film edge.

16. Method for imprinting a film web (3b), portions of which are to be arranged on containers, **characterized by** at least one printing step using the transfer method, wherein at least one, preferably at least two, but particularly three to five, different colors is(are) transferred to a transfer surface (27) and in a single step as a transfer printing layer to one side of the film web (3b).

17. Method according to claim 16, **characterized in that** one of the film web (3b) is provided with a preprint (3f) and/or a sealing layer (3g) already prior to said printing step using a transfer method, preferably by means of a gravure printing method, the transfer printing layer (3h) and the preprint (3f) being preferably applied to different sides of the film web (3b), wherein the preprint (3f) forms a primary coat or a basic decoration and is, in some cases, covered by a sealing layer (3g).

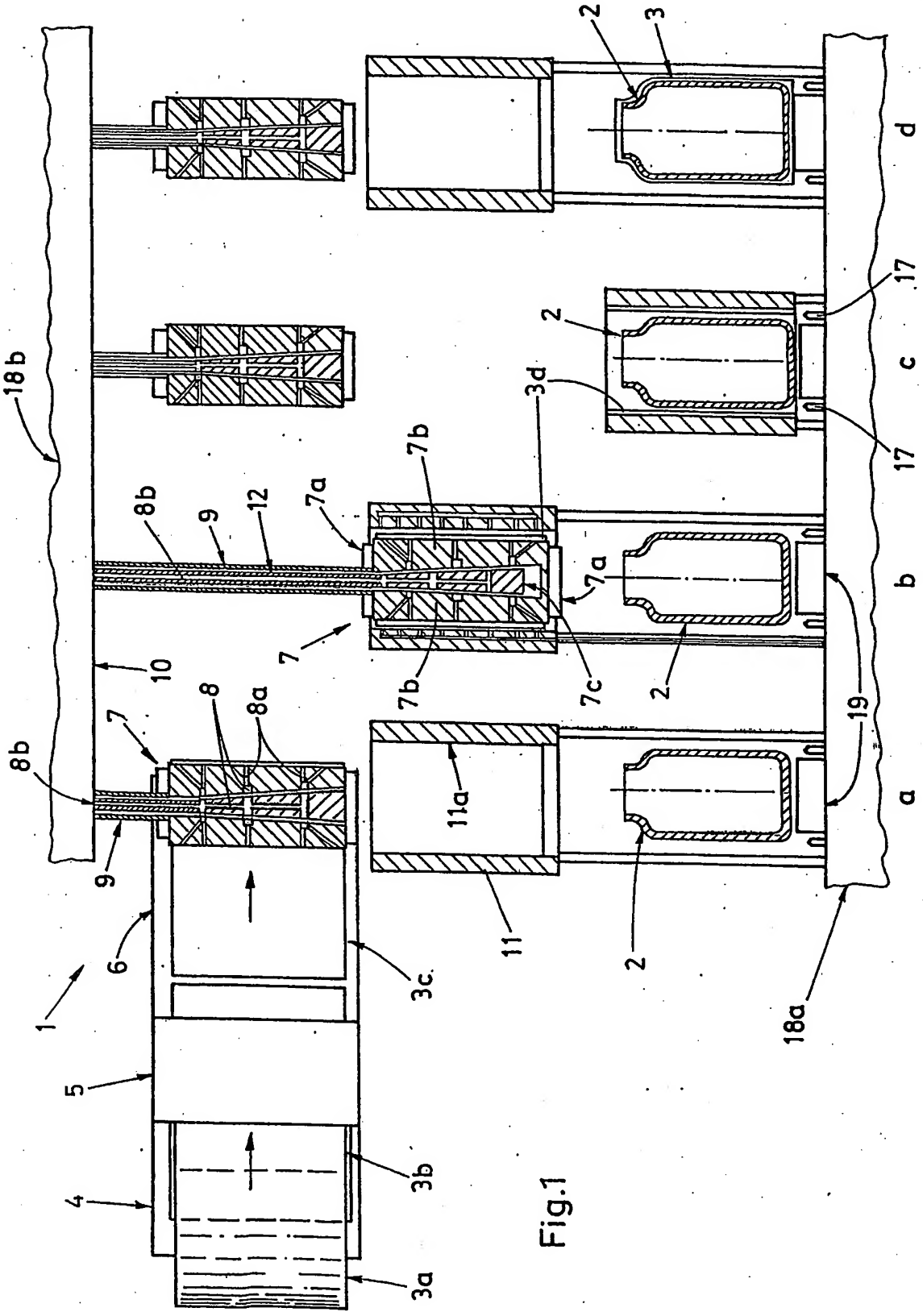


Fig.1

Fig.2

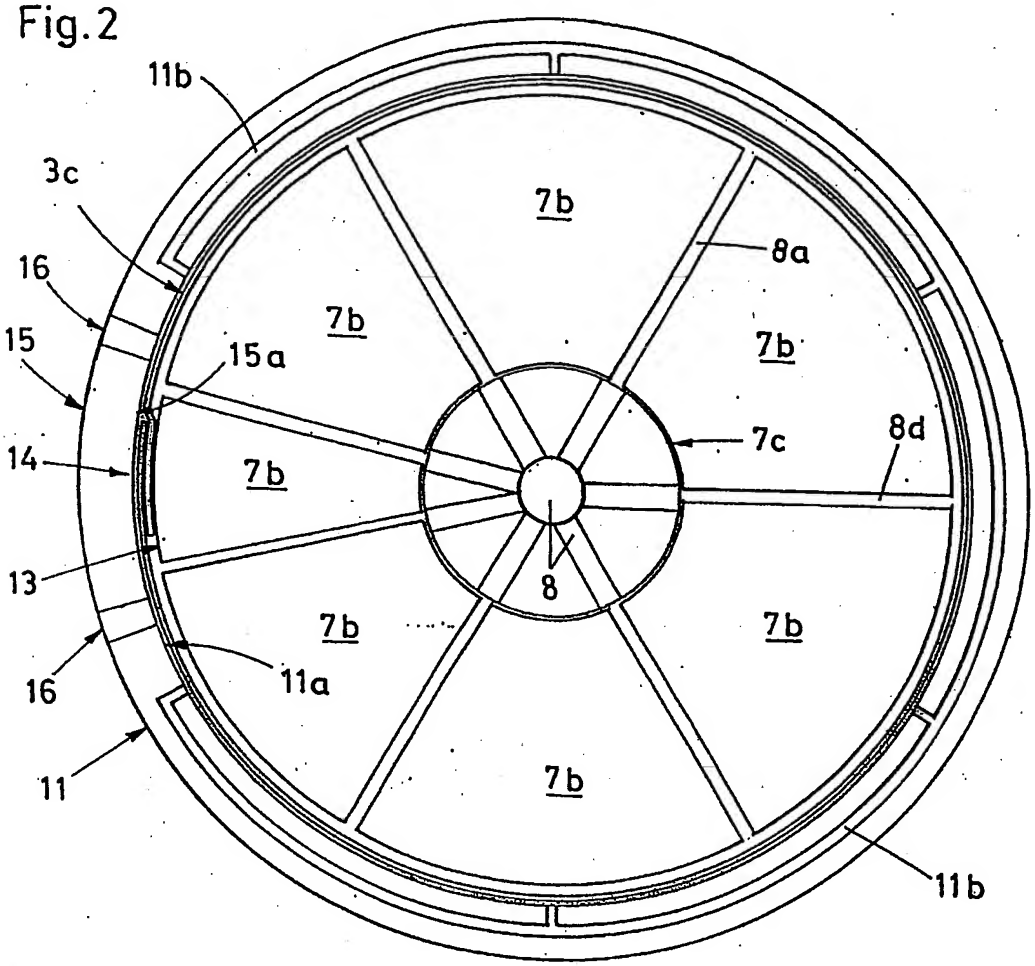


Fig.3

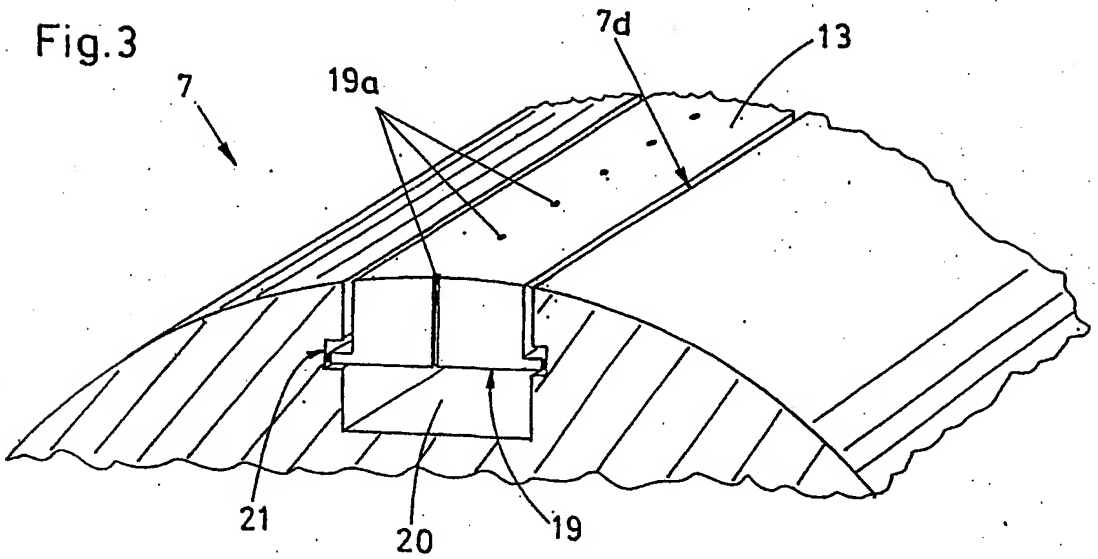


Fig.4

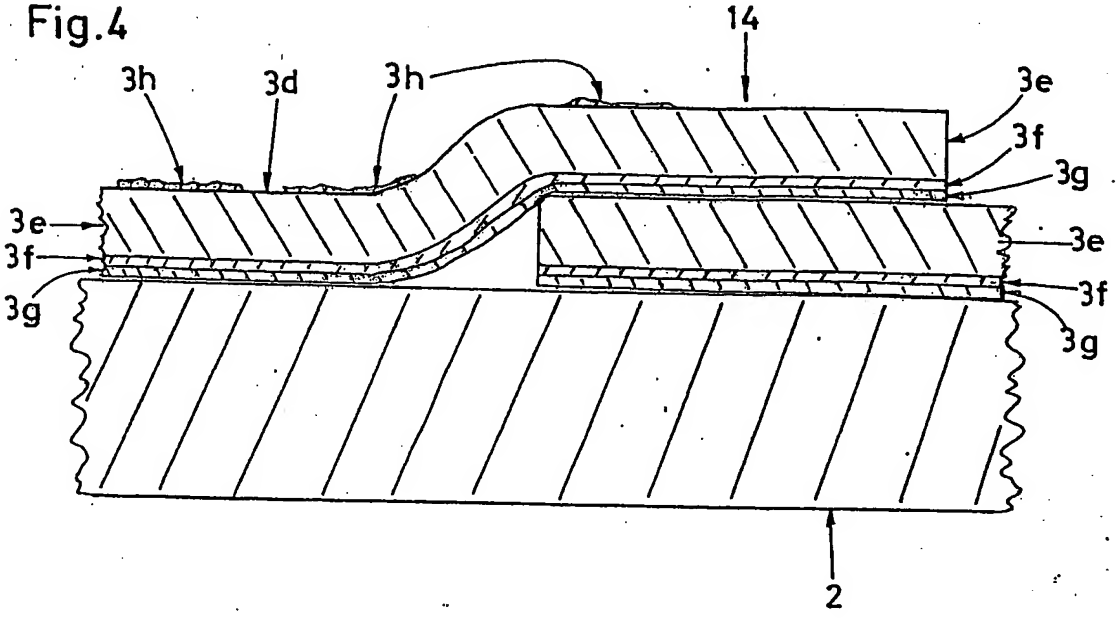
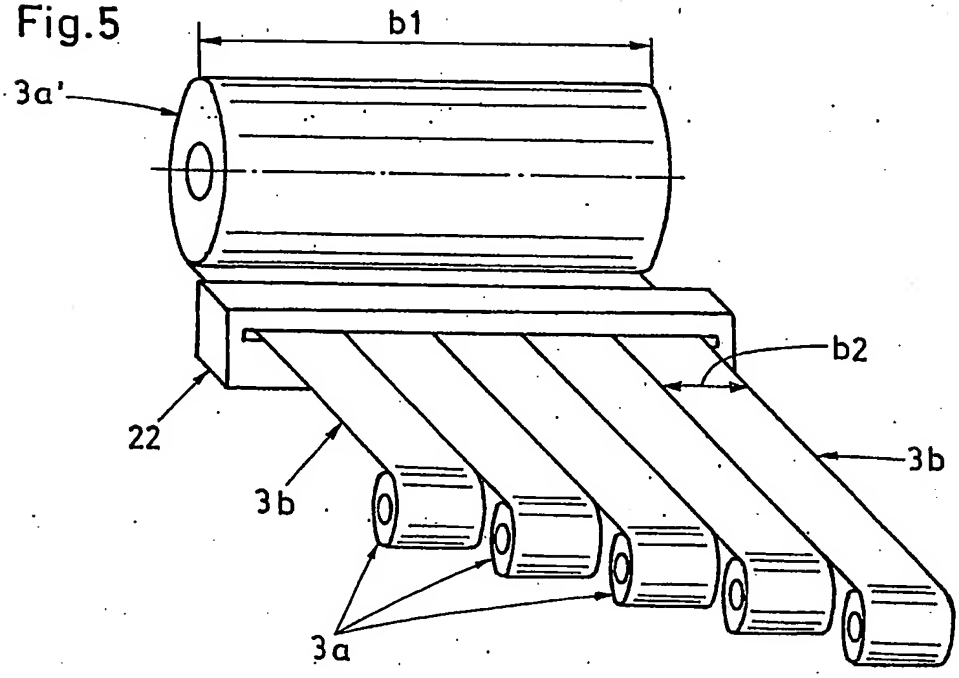


Fig.5



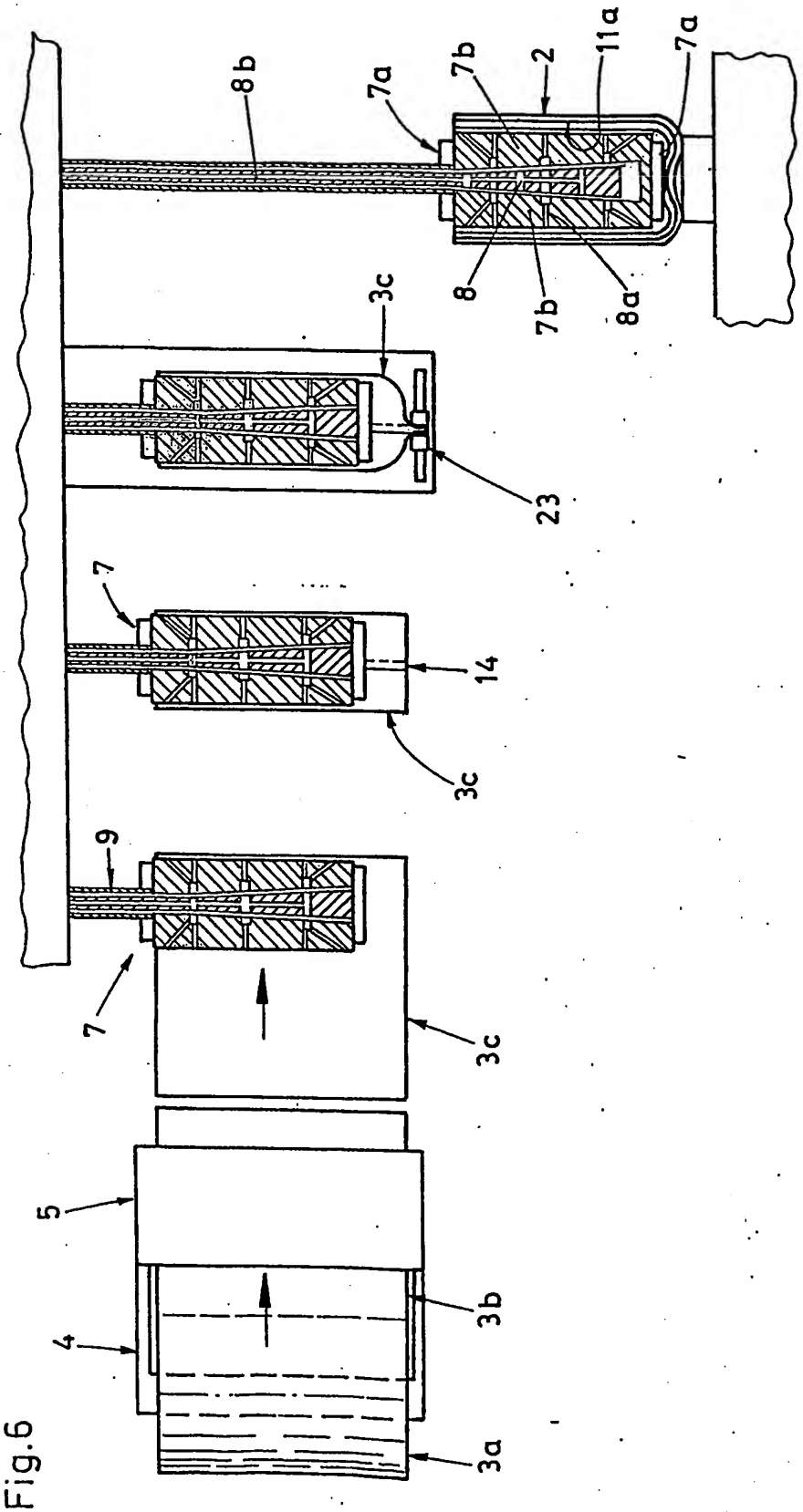


Fig.6

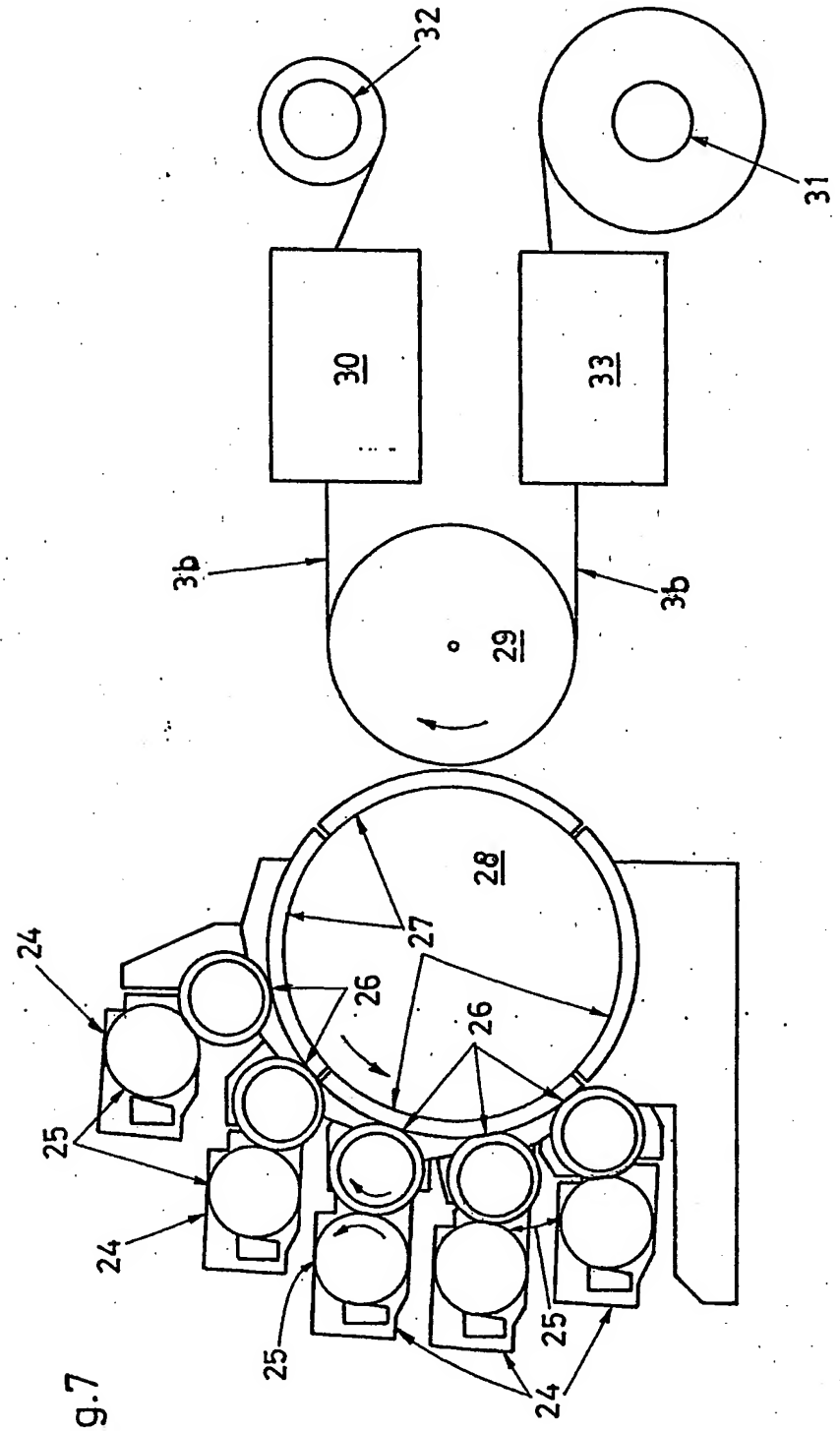


Fig.7

Fig.8